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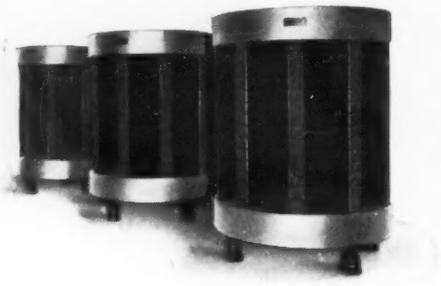
ELECTRICAL WORLD

KILOWATT-HOURS EXCEED PAST RECORDS

ANNUAL STATISTICAL AND REVIEW NUMBER



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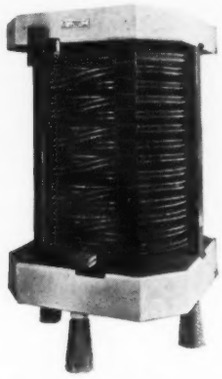

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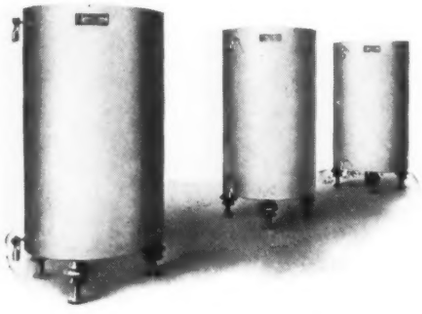

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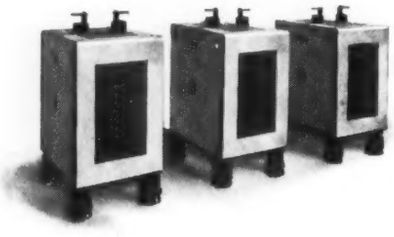

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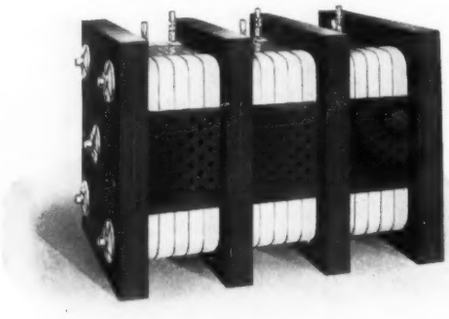

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ELECTRICAL WORLD

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January 4, 1936

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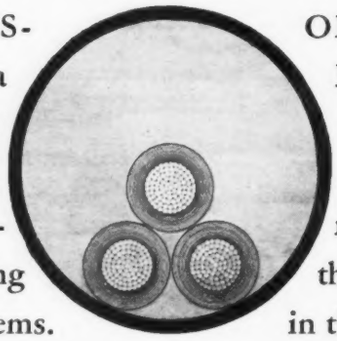

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Statistics Show Progress

ENERGY GENERATED in 1935 by all public utility plants aggregated 93,575,000,000 kw.-hr., as against a corresponding total of 85,970,000,000 in 1934. This is an increase of about 9 per cent. Of especial significance, however, is the great increase in output during the fall months that is being maintained. A weekly output at present of more than 2,000,000,000 kw.-hr. far exceeds any value heretofore recorded in the industry and is at an annual rate of 104,000,000,000 kw.-hr.

UTILITY REVENUE for 1935 for energy sales aggregated $1,923,500,000, as against $1,837,046,000 in 1934. This is a gain of about one-half per cent and reflects the effects of increased costs and lower rates. Greatly increased outputs in the last months of the year make a better indicator of revenue conditions and point to the possibility of an appreciable increase in earnings in 1936.

ENERGY SALES to ultimate customers amounted to 77,355,000,000 kw.-hr. in 1935, as compared to 70,782,000,000 in 1934. This is a gain of about 7 per cent. Here again the better measure of the current situation is found in the very large increase in energy sales during the fall months. On the basis of total energy sales and total revenue the average sales price per kilowatt-hour was 2.5 cents in 1935 and 2.59 in 1934.

UTILITY CUSTOMERS increased 2.1 per cent in number during 1935. The total number of customers at the end of the year was 25,341,203, as against 24,808,537. Of this total number now served 21,204,354 are domestic and rural, 3,772,007 commercial and 364,842 wholesale or industrial. The largest gain was made in rural customers, the number increasing from 743,954 in 1934 to 793,977 in 1935, a gain of 12.6 per cent.

UTILITY FINANCING during 1935 amounted to the large total of $1,063,670,700, of which $1,037,174,589 represented refunding issues and only $26,496,111 new capital. The reason for the large refunding program was the low money rates available and the good credit position of the operating utilities. Bonds aggregating $1,004,600,700 were placed at an average interest of about 3.5 per cent. During 1936 utility maturities amount to $59,278,100 and the major problem of finance will be the necessity of selling equity securities.

CAPITAL EXPENDITURES by public utilities amounted to $237,463,487 in 1935 and maintenance expenditures $92,886,745. Budget estimates for capital expenditures in 1936 are $371,557,774 for capital and $100,947,105 for maintenance. The large increase contemplated for this year results from the necessity to add capacity and strengthen facilities to carry the largely increased loads and the unprecedentedly large program for rural electrification. It may be noted that expenditures on federal projects of about $150,000,000 in 1935 and contemplated expenditures of $250,000,000 in 1936 add an appreciable magnitude to the effect of electrical expansion on national prosperity and recovery. Yet this federal expenditure in itself prevents the in-

dustry from spending even larger sums because of its competitive and threatening aspects.

EQUIPMENT SALES by electrical manufacturers as measured by value of products are estimated as $850,000,000 for 1935. Estimates for 1936 are for sales of $920,000,000, a 21 per cent gain. This value is still far below the peak of $2,350,000,000 in 1929, but represents the best prospects since that time. It may be noted that gains have been made and are contemplated in sales of all classes of equipment in all markets. During 1936 an appreciable gain is expected in the sale of heavy electrical equipment to utilities. Appliance sales were at record value in 1935, but are expected to exceed these figures at least 25 per cent in 1936. Measured by retail values, electrical equipment sales are in contemplation aggregating at least $2,000,000,000 in 1936. These figures and estimates show the magnitude and the widespread effect of the electrical industry marketing activities.

COMMERCIAL BUSINESS represents "main street" business for several classes of energy use and equipment sales. The number of commercial customers was 3,772,007 at the end of 1935, a gain of 44,529. Energy use increased from 13,151,000,000 kw.-hr. in 1934 to 14,053,000,000 kw.-hr. in 1935. Revenue from energy sales increased from $511,682,000 to $536,600,000. Some of the gain in number is due to larger use of some customers and smaller use by others to cause changes in classification from wholesale to retail or the reverse. Modernized lighting, commercial electric cooking and air conditioning were the three major activities to cause an increase in this business. Reports indicate that very promising marketing possibilities now exist in this class of business.

INDUSTRIAL BUSINESS has been increasing steadily for some months. The total industrial customers numbered 364,842 at the end of 1935 and they used 41,184,000,000 kw.-hr. of energy, as compared to 36,919,000,000 kw.-hr. in 1934. The revenue from energy sales mounted from $495,657,000 to $532,500,000. Reports from all sections show that industrial plants in general are busy and expect increased business. In addition to this recovery a widespread reconstruction and modernization program exists that requires more electricity and more electrical equipment. A noticeable increase in new factory building and in new commercial buildings has been made lately, with bright prospects ahead.

DOMESTIC BUSINESS for the electrical industry was very good in 1935 and is expected to increase in 1936. The number of domestic customers was 20,987,563 at the end of 1935 and represents a gain of 503,331 customers during the year. These customers used 13,993,000,000 kw.-hr. of energy, as contrasted to 12,798,000,000 kw.-hr. in 1934. Utility revenue from energy sales to these customers was $709,200,000 in 1935, as compared to $677,697,000 in 1934. In unit terms energy use increased nearly 10 per cent and revenue less than 5 per cent. During the year the domestic market absorbed record-breaking totals in all classes of appliances and this business is expected to increase steadily in 1936. Another favorable factor is the decided upturn in new home building and reconstruction that promises to increase and thus aid greatly the contracting and wiring supply branches of the business.

Utility Records Encouraging

COMPLETE statistics for the light and power industry in 1935 and business prospects for 1936 give encouragement. Energy sales increased in all classes of business. Refunding financing of more than a billion dollars reduced fixed costs and attested the credit position of utilities. More than half a million new customers were added. All the favorable aspects continued to improve during the year and promise to keep on this upward trend.

Profits by this branch of the industry were not commensurate with the expansion of business. Lower rates and increased costs and larger taxes practically offset the effect of business gains during the year. However, if no added cost burdens are placed on the industry the volume of operations during the last quarter of 1935 and now in prospect promises greater prosperity.

Possibly the most fundamental change in the status of this branch of the industry is found in an improved organization and better public relations. While court battles rage, the operating properties have been busy adding business, serving customers and building up their organization to meet the new conditions. The morale of the industry has improved as well as its position in the marketplace.

Commercial departments have been strengthened to make direct and co-operative sales and the results speak for themselves. While the government has been talking about rural service the utilities have put millions into thousands of miles of line and other facilities to serve the farms. An unprecedented increase has been had in domestic business and plans are in operation for further gains.

Despite harassments, threats, unfair competition and punitive legislation the data show that the industry has moved forward and plans to maintain its advance. The record is here to read. The facts are completely presented.

We doubt if anyone appreciates the effective aid the utilities are giving to recovery and employment even under present handicaps. We doubt that it is realized that this industry would be at least doubly effective if its hands were untied and if it received encouragement to go ahead at full speed. We hope the data and opinions in the following pages aid in showing the vital importance of the utilities to national recovery and prosperity.

Utilities in Recovery

ENERGY SALES

1934. (kw.-hr.)	70,782,000,000
1935. (kw.-hr.)	77,355,000,000

REVENUE

1934	$1,837,046,000
1935	$1,923,500,000

CUSTOMERS

1934	24,808,537
1935	25,341,203

CAPITAL EXPENDITURES AND BUDGET

1935	$237,463,487
1936	$371,557,774

FINANCING

1934	$131,175,000
1935	$1,014,670,700

Energy Generated Shows Broad Resumption

Sets Record

Central stations sold 77,355,000,000 kw.-hr.

Domestic sales, close to 14,000,000,000 kw.-hr., 9 per cent above 1934

UNSURPASSED total energy sales, larger domestic use than ever before, a rapidly rising demand by large industrial consumers—these are the features that characterized central-station operations in 1935.

These sales called for an energy production of 93,575,000,000 kw.-hr., or well over 2,000,000,000 kw.-hr. above the production in 1929, the previous maximum, 9 per cent above 1934 and 20 per cent above 1933, which was the low year. In October the largest previous month's output was passed, and the year-end rise established a still higher all-time record.

The same statements apply, approximately, to the actual sales to users, amounting to 77,355,000,000 kw.-hr. The difference between the two figures is due to company use and energy lost or unaccounted for.

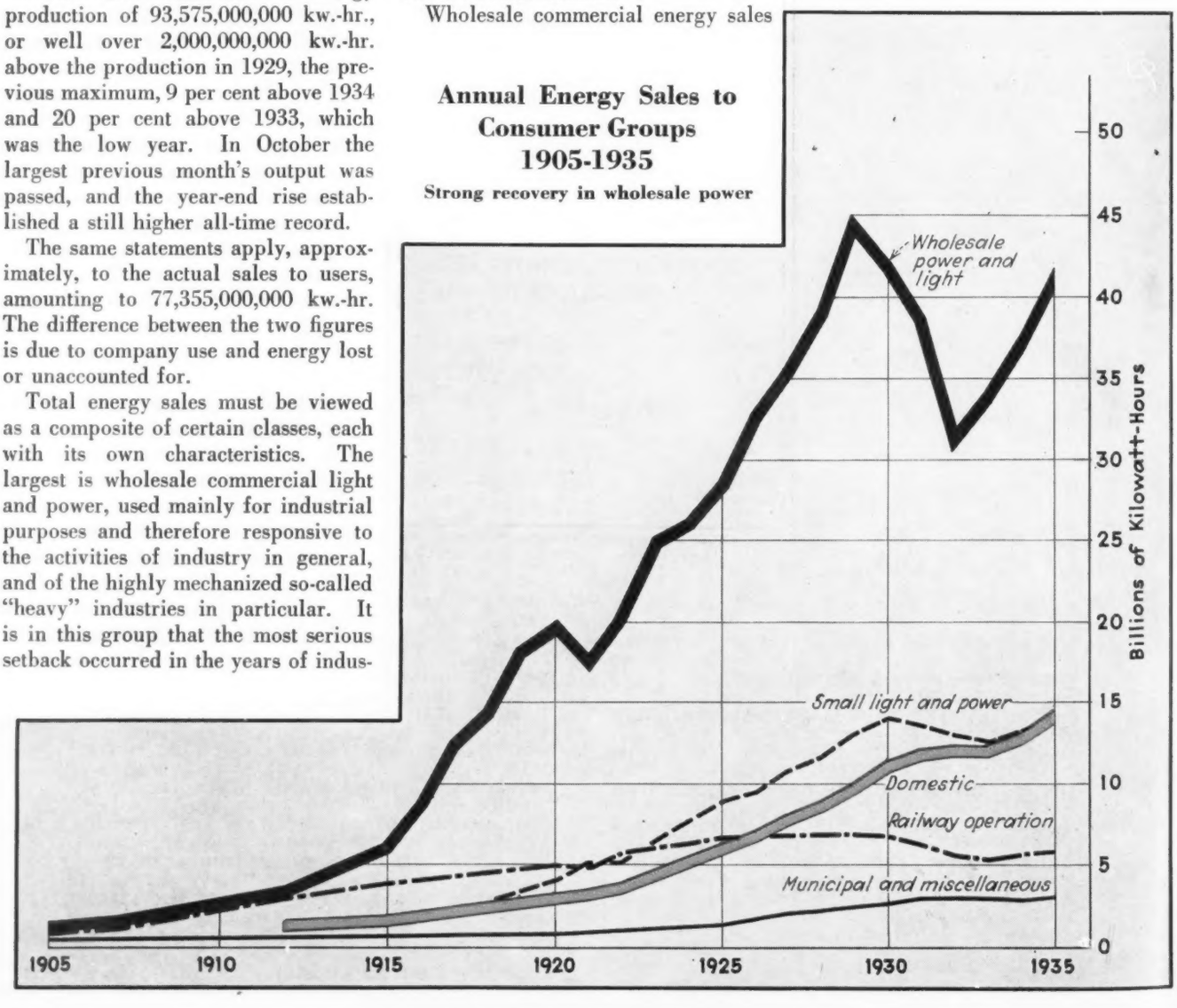
Total energy sales must be viewed as a composite of certain classes, each with its own characteristics. The largest is wholesale commercial light and power, used mainly for industrial purposes and therefore responsive to the activities of industry in general, and of the highly mechanized so-called "heavy" industries in particular. It is in this group that the most serious setback occurred in the years of industrial recession; it is here, also, that the most striking advance has been made during the past three years, and especially in 1935, and it is in this group, finally, that the further rise now indicated will have the largest effect on total demand.

Wholesale commercial energy sales during 1935 amounted to 41,184,000,000 kw.-hr. and constituted 53 per cent of all sales. These industrial sales were 11 per cent greater in 1935 than in 1934, and the advance over 1932 was 32 per cent. They approximated the kilowatt-hours in 1930 and lacked 7 per cent of matching 1929.

In the light of figures that have

Annual Energy Sales to Consumer Groups 1905-1935

Strong recovery in wholesale power



# of 93,575,000,000 Kw.-Hr.

been published on unemployment, and with production in many important lines still far below previous levels, this relatively close approach to the energy consumption in the years of greatest industrial activity calls for comment.

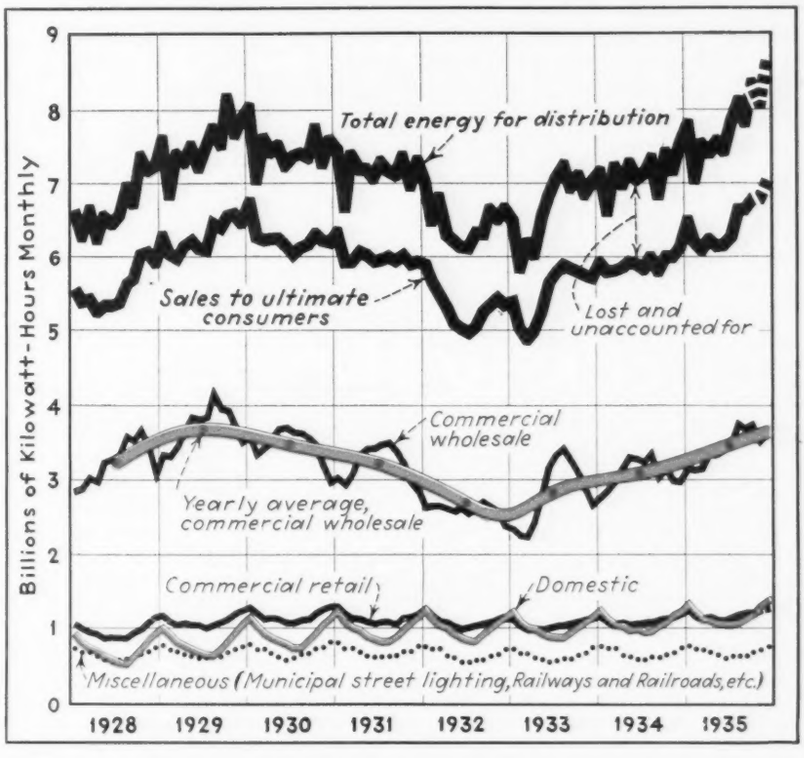
It has been asserted that great progress has been made in industrial mechanization even under the unfavorable conditions prevailing since 1929. The statistics appear clearly to support that assertion.

Conclusions drawn from the yearly totals are emphasized by the accelerated advance during the second half year. This is brought out by the chart showing monthly sales. Wholesale energy consumption generally comes to a maximum in summer and then declines. In 1935, on the contrary, there has been a virtually uninterrupted rise, which by October had amounted to 25 per cent compared with the preceding December and 19 per cent over October, 1934.

Of the major classes of energy sales, those for domestic use have shown the most consistent advance. The rise in 1935 over 1934 exceeded 9 per cent. The total was close to 14,000,000,000 kw.-hr. This was 43 per cent more than in 1929. No better evidence could be found of the extent to which electricity has become interwoven in our daily life and has grown to be a household necessity.

A pronounced summer "valley" is characteristic of the domestic load. The more widespread use of heavy appliances, especially refrigerators, has gone far to reduce these annual swings. A comparison of summer and winter figures illustrates the change. In 1935 the January sales were 31 per cent greater than in 1929, but August sales were 68 per cent greater. The seasonal difference in kilowatt-hours is equivalent to the summer consumption of some 3,000,000 to 4,000,000 refrigerators. The virtual elimination of the summer valley, as to kilowatt-hour sales, therefore, is not a fantastic idea.

Retail commercial sales (small light and power) were about equal to domestic, slightly greater than in the best previous year and 7 per cent above 1934. During the latter '20s this class was far ahead of domestic, but it suffered a setback after 1930.



Monthly Energy Sales Registered Successive Phases of Depression and Recovery

Distribution of Central Station Energy—1926-1935

(Millions of Kilowatt-Hours)

Year	Generated In Central Stations*	Distributed to Ultimate Consumers								Losses	Company Use		Total Including Purchased Energy
		Total	Domestic	Com'l Light and Power		Municipal Street Lighting	Electric Railways	Electrified Railroads	Municipal and Miscel.		Railway	Other	
				Retail	Wholesale								
1926	69,158	56,089	6,827	9,485	32,615	1,589	4,951	426	196	11,834	1,530	1,023	70,476
1927	74,686	61,251	7,676	10,766	35,263	1,741	5,039	504	262	12,659	1,348	1,111	76,369
1928	82,927	66,988	8,619	11,692	38,903	1,911	4,991	560	312	13,842	1,330	1,235	83,395
1929	91,421	75,294	9,773	13,106	44,326	2,038	5,049	590	412	14,983	1,279	1,201	92,757
1930	89,952	74,906	11,018	13,944	41,621	2,227	4,997	591	508	14,561	1,184	1,306	91,957
1931	86,312	71,902	11,738	13,544	38,451	2,320	4,549	626	664	14,162	970	1,366	88,400
1932	77,868	63,764	11,987	12,932	31,186	2,364	4,175	540	580	13,678	843	1,220	79,505
1933	79,983	65,754	11,960	12,475	33,723	2,213	4,004	661	718	14,256	699	1,204	81,913
1934	85,970	70,782	12,798	13,151	36,919	2,203	4,352	703	656	14,782	652	1,361	87,577
1935†	93,575	77,355	13,993	14,053	41,184	2,329	4,379	825	592	16,039	600	1,380	95,374

*Courtesy U. S. Geological Survey with deductions for plants not considered as central stations for light and power. †Estimated on ten months' operations.

Revenue Grows Again as Sales Rise

Gross Utility

Sales to Ultimate Consumers, $1,923,500,000, Rise 4.7 per Cent Over 1934

Average Domestic Rate Falls to 5.07 Cents

REVENUE for electric service in 1935 amounted to $2,068,500,000, of which $1,923,500,000 was received for sales to ultimate consumers. The additional $145,000,000 is the estimated revenue for energy sold to other utilities for resale. From this there must be deducted $905,100,000 for maintenance and operating expenses and approximately $260,000,000 for taxes, leaving a net income before depreciation and interest of $917,100,000. The corresponding amount for 1934 was $863,260,000, against gross of $1,980,460,000. Thus, the increase in gross, $88,040,000, was considerably larger than the increase of $52,840,000 in net.

Of the $1,923,500,000 received from ultimate consumers, 37 per cent was for domestic service, 28 per cent for retail commercial sales (small light and power) and slightly less for energy sold at wholesale to large users. The balance came from various smaller groups. The total was 4.7 per cent more than in 1934.

While revenue was larger than in the three preceding years, the advance has not kept pace with the rising energy sales. The latter were greater in 1935 than in any other year. Revenue figures, in contrast, were smaller than in 1929, 1930 or 1931 and 3.4 per cent under the maximum. The industry is getting less revenue for more energy.

The only class of service that is now earning more than in former years is the domestic. Its curve turned downward after 1931, but the subsequent rise to $709,200,000 meant an increase of 4 per cent over that year's revenue. This was in return for an increase of more than 19 per cent over 1931 in kilowatt-hour sales.

Rate reductions, combined probably with more consumption in the lower brackets, have brought down the average rate to 5.07 cents per kilowatt-hour. In 1934 it was 5.40 cents. As recently as 1930 it was 6.03 cents. Put thus in fractions of a cent, the change may seem small; actually there was a decrease in five years of 16 per cent. For the benefit of persons who like to think of 1926 as a "normal" year it may be remarked that the present average rate is nearly 28 per cent lower.

Revenue from Ultimate Consumers, by Regions

(In Millions of Dollars)

	1931	1932*	1933	1934	1935[1]
United States	**1,976**	**1,821**	**1,773**	**1,837**	**1,924**
New England	162	155	154	158	164
Middle Atlantic	579	541	526	544	565
East No. Central	458	413	400	416	444
West No. Central	168	155	150	158	163
South Atlantic	174	161	160	163	171
East So. Central	72	65	63	64	67
West So. Central	110	101	97	101	104
Mountain	59	52	51	53	58
Pacific	194	177	172	180	188

*U. S. Census of Electric Light and Power
[1]Estimated on ten months' operations

Revenue of the Electric Light and Power Industry by Sources—1926-1935

(Thousands of Dollars)

Year	Revenue from Ultimate Consumers[1]								Other Electric Service[4]	Total Revenue for Electric Service[4]
	Total	Domestic	Com'l Light and Power		Municipal Street Lighting	Electric Railways	Electrified Railroads	Municipal and Misc.		
			Retail	Wholesale						
1926	1,520,159	478,182	427,407	488,915	68,023	47,618	4,373	5,641	101,391	1,621,550
1927	1,661,032	523,689	482,136	519,074	77,248	47,965	5,172	5,748	141,623	1,802,655
1928	1,784,309	571,620	519,957	549,989	83,024	46,489	5,560	7,670	157,646	1,941,955
1929	1,938,520	618,799	555,640	613,172	88,323	46,277	5,986	10,323	167,380	2,105,900
1930	1,990,955	664,441	575,598	590,992	95,458	46,068	6,015	12,383	160,195	2,151,150
1931	1,975,944	678,611	564,524	570,127	99,299	41,912	6,725	14,746	149,166	2,125,110
1932[2]	1,832,596	669,200	528,861	476,450	100,919	38,311	5,821	13,034	147,394	1,979,990
1933	1,773,416	656,570	499,684	465,191	94,270	36,359	6,550	14,792	132,694	1,906,110
1934	1,837,046	677,697	511,682	495,657	92,984	37,838	6,726	14,461	143,414	1,980,460
1935[3]	1,923,500	709,200	536,600	532,500	89,200	36,900	7,300	11,800	145,000	2,068,500

[1]Edison Electric Institute. [2]For consistency with other years E. E. I. figures are given for census year 1932. Census total is $1,975,303,955; to ultimate consumers $1,821,105,524. [3]Estimated on the basis of ten months' operations. [4]Including sales for resale, involving some duplication.

Revenue at $2,070,000,000

Consumption and average bill per customer were larger than ever, 676 kw.-hr. and $34.20, respectively, against 631 kw.-hr. and $33.44 in 1934. The former is definitely a high-water mark never before approached. The latter is only a little more than in 1931. The ratios are based on the mean of the number of domestic customers at the beginning and end of the year as given at the bottom of page 64.

Revenue for commercial service, large and small, declined materially in the earlier years of the depression. During the past two years it has been rising again, but the lost ground has been only partly recovered. Wholesale suffered more than retail, being directly affected by the declining industrial output, but its response to the recent industrial demand has also been stronger. With respect to this class, comparison of the charts for energy sales and for revenue shows that the former are closer to their previous peak than the latter, again indicating a lowering of rates.

Municipalities, it would seem, have been bargaining for their street lighting. They used about the same amount of energy as four years ago, but they have been getting it for 10 per cent less pay. This municipal lighting business is now 4.6 per cent of the total.

Revenue from electric railways has shrunk by nearly a fourth in the past nine years. During the same period revenue from electrified steam railroads increased by two-thirds. Taking the industry as a whole, these are among the smaller items of income.

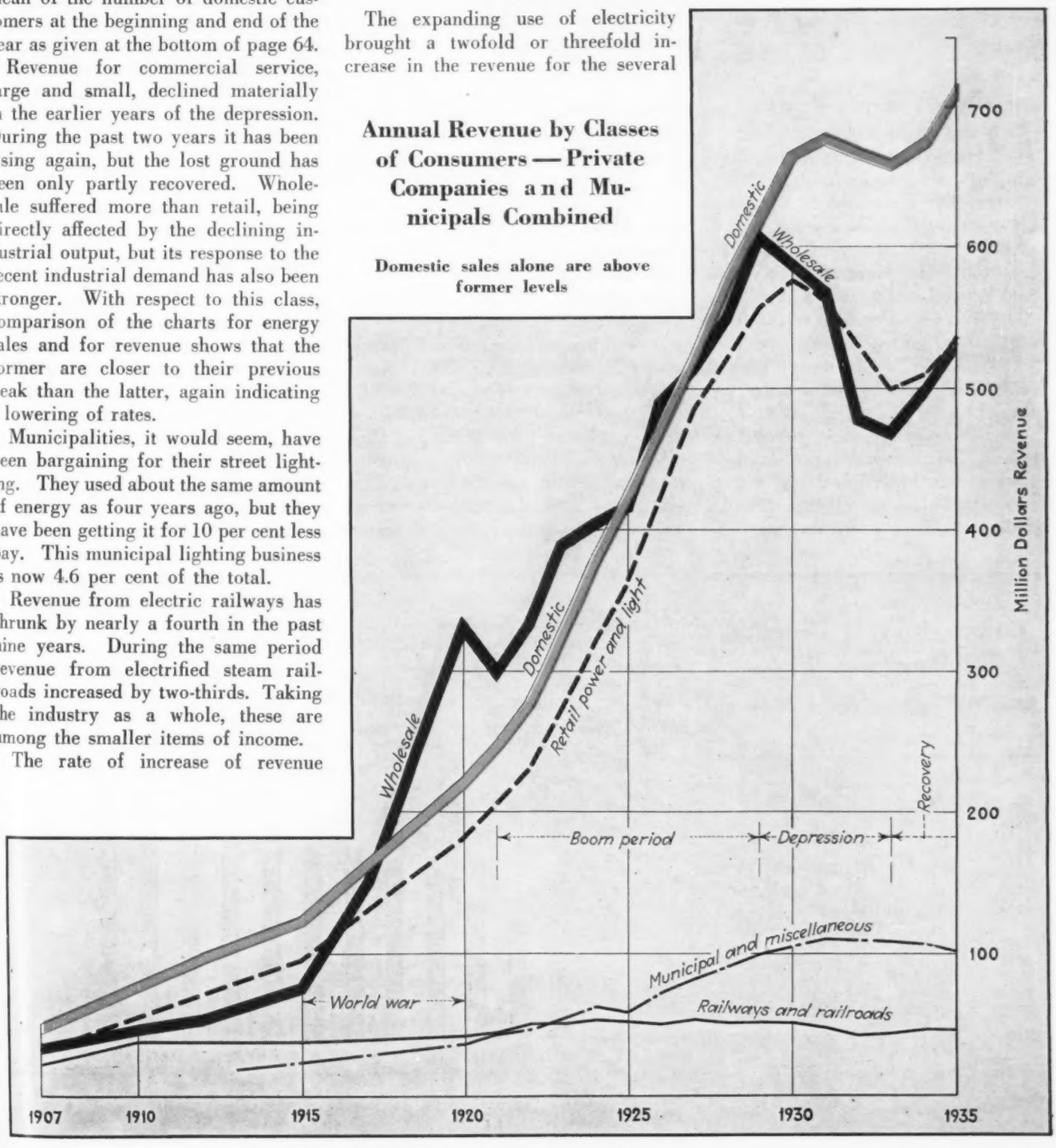
The rate of increase of revenue compared with 1934 ranged from 3 to 9 per cent in the different sections. It was largest in the Rocky Mountain and East North Central States, reflecting the greater activity in the mining of metals in the West and in manufacturing in the Central area.

Summary

The expanding use of electricity brought a twofold or threefold increase in the revenue for the several classes of service during the decade from 1919 to 1929. Then came the recession. Present progress may be viewed as a continuation of the former rise displaced by five years, more or less, and not necessarily moving at the former rate.

Annual Revenue by Classes of Consumers — Private Companies and Municipals Combined

Domestic sales alone are above former levels



Operating Expenses Increase

Taxes Higher Than Ever

Total Expense

Operating Expenses $905,100,000, Salaries and Wages Taking $328,000,000

Tax Ratio Mounts to 14.2%

DURING the year 1935 the electric light and power industry spent $905,100,000 for operating expenses and maintenance, $260,000,000 for taxes and $237,500,000 for new construction—a grand total in excess of $1,400,000,000. Each of these constituted an increase over 1934. Salaries and wages rose nearly $50,000,000, taxes about $14,000,000, new construction expenditures more than $60,000,000. The last-named item is more fully discussed elsewhere in this issue.

Operating and maintenance expenses, like revenue, were at their maximum in 1930, amounting in that year to $946,180,000. During the succeeding three years they decreased, by $150,000,000, while total revenue for electric service declined nearly $250,000,000. After that the upward trend of former times reasserted itself, with expenditures in 1935 about $110,000,000 greater than in 1933. Payrolls have been increasing; fuel consumption has been growing and will continue to grow with the expanding demand for energy.

These changes were reflected in variations in the operating ratio, which had dropped from 46 per cent in 1927 to 41.4 per cent in 1932 and has since risen to 43.7 per cent. With declining rates for energy, larger output, greater fuel consumption probably at rising prices and advancing payrolls further improvements in the ratio of expenses to revenue are unlikely. Only operating and maintenance expenses are here included, not taxes or retirement reserves. The figures refer to all operating establishments, municipal as well as commercial. So far as was possible they are taken from census reports. For non-census years they are based on data that is compiled by the ELECTRICAL WORLD.

Stabilized Employment

Throughout the depression the electric light and power industry has been spending about $300,000,000 annually in salaries and wages. In most years the amount was somewhat larger. Since 1927 the number of employees has held close to a quarter million, fluctuations being limited to 20 per cent above and 10 per cent below. Salaries and wages are the largest item of oper-

Comparison of Revenue, Expenses and Taxes

Entire Industry, Including Municipals

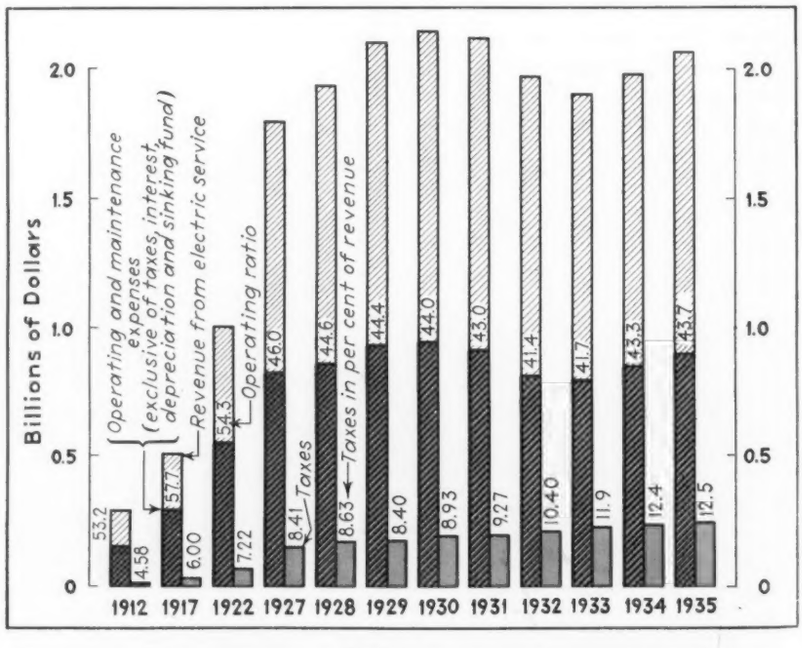
(Thousands of Dollars)

Year	Total Revenue for Electric Service	Operating and Maintenance Expenses (ex. Taxes)	‡Taxes
1912*	237,139	152,629	13,147
1917*	502,060	289,912	30,063
1922*	1,020,329	553,068	73,772
1927*	1,802,655	828,168	151,600
1928	1,941,955	866,350	167,700
1929	2,105,900	934,890	176,800
1930	2,151,110	946,180	192,200
1931	2,125,110	913,910	197,200
1932*	1,975,304	817,956	205,151
1933	1,906,110	795,811	216,300
1934	1,980,460	857,200	246,500
1935†	2,068,500	905,100	260,000

*Census. Expenses and taxes in 1927 adjusted to include small municipals omitted from census as to those items

†Estimated on ten months operations

‡Taxes for non-census years 1928–1931 based on chart in E. E. I. Stat. Bul. No. 2; for 1933 and 1934 as estimated by E. E. I.



Revenue, Operating and Maintenance Expenses, Taxes

Commercial and municipal establishments combined

Amounts to $1,400,000,000

ating expense and account for one-sixth of the total revenue.

Rendering an essential service for which the demand was not drastically curtailed even in the worst period, the industry has exerted a stabilizing influence on employment. During the past two years there has been a moderate increase both in the number of employees and in their average wage. These relatively moderate changes are in marked contrast with those in some branches of manufacturing, in which employment dropped to one-fourth or less of the "prosperity" maximum.

The source of the data is again the reports of the census, supplemented by index numbers announced by the Bureau of Labor Statistics for non-census years.

Taxes ever increasing

During the depression every statistical item relating to the electric power industry receded—with one exception, taxes. Be the times good or bad, our enforced contributions for the blessings of government grow with the passing years. In 1935, according to preliminary data, taxes paid by electric utilities were equal to four-fifths of the payments to employees. This $260,000,000 of taxes was 12.5 per cent of the total revenue for electric service. Thus it appears at first glance that one dollar in eight goes to taxes.

Revenue and Taxes

Commercial Companies Only

Compiled by Edison Electric Institute

Year	Gross Operating Revenue* (Thousands of Dollars)	Taxes (Thousands of Dollars)	Ratio Tax./Rev. (Per Cent)
1902	77,132	2,655	3.44
1907	156,447	6,346	4.06
1912	268,360	13,117	4.89
1917	464,881	29,897	6.43
1922	883,334	73,128	8.28
1927	1,588,908	150,253	9.46
1932	1,737,973	203,858	11.73
1933†	1,690,000	215,000	12.7
1934†	1,740,000	245,000	14.1
1935‡	1,820,000	258,600	14.2

Data from U. S. Census, except last three years.
*Includes revenue from ultimate consumers, from sales to municipal plants for "resale" and miscellaneous operating expenses.
†Preliminary, computed by E. E. I.
‡Estimated on ten months' operations.—ELECTRICAL WORLD

But this statement falls short of the facts when the analysis is confined to private companies and when the municipal plants, which pay much smaller taxes, are separated out. This separation is made in the table that gives revenue and taxes for commercial companies only. Since these latter sell about 94 per cent of all the energy sold their figures are the ones that concern the great majority of consumers.

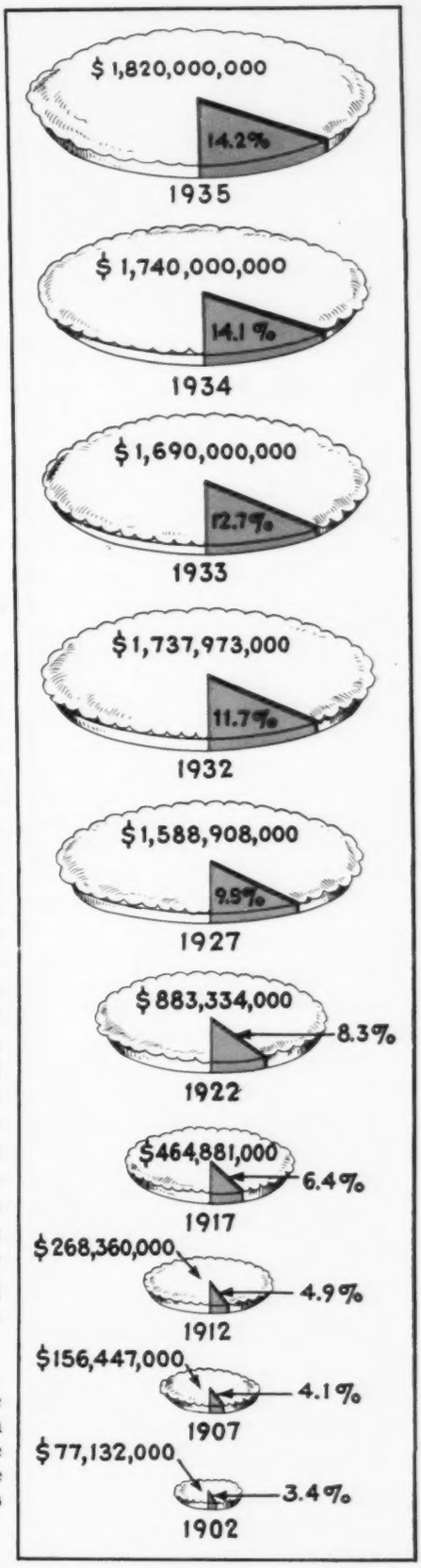
Back in 1902 their taxes absorbed 3.44 cents of the dollar received from the consumer. The portion had about doubled in 1917 and nearly redoubled in 1932. Now one dollar in seven which the customer ostensibly pays for electric service is really a tax payment, the utility company functioning as a deputy collector.

Salaries and Wages

Commercial and Municipal Establishments

Year	Number of Employees			Salaries and Wages (Thous.)
	Comm'l	Munic.	Total	
1902*	26,909	3,417	30,326	$20,647
1907*	42,066	5,566	47,632	35,420
1912*	71,395	7,940	79,335	61,162
1917*	94,679	10,862	105,541	95,242
1922*	136,105	14,657	150,762	212,433
1927*	234,747	16,273	251,020	390,000†
1928	.....	.....	265,000	.....
1929	.....	.....	289,000	405,000
1930	.....	.....	298,000	423,000
1931	.....	.....	282,000	392,000
1932*	225,557	19,016	244,573	323,880
1933	.....	.....	232,000	292,000
1934	.....	.....	247,000	316,000
1935‡	.....	.....	248,000	328,000

*U. S. Census. †Adjusted to include municipal plant wages omitted from census. ‡Estimated on ten months' operations.



Tax Slice One-Seventh of Revenue of Private Companies

Add 533,000 New Customers

In Two Years More Than a Million Customers Have Been Added, Exceeding Predepression Totals. Totals in 1935: Domestic and Farm, 20,987,000; Retail Commercial, 3,772,000; Wholesale and Other, 582,000

MORE customers are now receiving electric light and power service than ever before. Including municipal, the number as of December 31, 1931, was 25,341,203, compared with 24,808,537 announced by the Edison Electric Institute for the end of 1934.

During the past two years they have been increasing at the rate of half a million annually. An estimate by states and classes is given in the accompanying table. The year's increase was 532,666, or approximately the same as in 1934.

The new total is about 800,000 larger than the maximum number before the depression. Thus, all the customers lost in 1931 and 1932 have been regained (or their equivalent) and many new ones added. The families that had "doubled up" or that had gone to live with the old folks on the farm have resumed living in their separate homes. Small stores and shops have been reopened.

Customers using electricity for household purposes form the largest group. Excluding those living on farms, they now number 20,410,397. But since the domestic revenue and energy consumption include farm use except in the irrigation areas, these farm homes in the first six geographical regions must be included, making a total of 20,987,563.

The increase of about 503,000 is close to 2.5 per cent. Growth has been remarkably uniform in the different sections. Most of the regional percentages do not differ greatly from the average; the West South Central, however, comes up to almost 4 per cent and the states of Georgia, Tennessee and Alabama around 5 per cent.

Extension of service to farms has gone forward at a relatively more rapid rate than in other classes. Farm customers numbered 794,000 at the end of the year, or 50,000 more than at the end of 1934. That is to say, a group containing only 3 per cent of the total number of customers got 10 per cent of the total increase. Of the whole number of farms, 12.6 per cent now have central station light and power service.

Considerable nonsense has been written on this matter of farm electrification and misleading statements have been issued, unfortunately emanating from government sources. Comparisons have been made with the percentages of farms in foreign countries having electricity, much to the disparagement of the United States.

Aside from other considerations that make the comparisons questionable, it is absurd to include the great cotton plantations of the South, grain fields of the prairie states, or the ranches of the West and set the result over against a count of the much smaller farms in densely populated European countries. In similar areas in the United States the saturation far exceeds the national average. In New England as a whole it is 49 per cent, in the Middle Atlantic States 36, and in the Pacific 54 per cent. In New Jersey, several New England and three Western states it is about 60 per cent.

Small light and power customers together with wholesale and miscellaneous show a combined total of 4,136,849, which increased 22,295 over the

Growth in Farm Electrification

(Figures on Electrified Farms Do Not Include Those with Individual Lighting Plants)

Year	Total Number of Farms	Electrified Farms (Dec. 31)	Per Cent of Total
1900..	5,737,372		
1910..	6,361,502	(Data Not Available)	
1920..	6,448,343		
1921..	.....		
1922..	.....		
1923..	.....	177,561	2.8
1924..	.....	204,780	3.2
1925..	6,371,640	246,150	3.9
1926..	.....	309,125	4.9
1927..	.....	393,221	6.2
1928..	.....	506,242	8.0
1929..	.....	576,168	9.2
1930..	6,288,648	649,919	10.4
1931..	.....	698,786	11.1
1932..	.....	709,449	11.3
1933..	.....	713,558	11.4
1934..	.....	743,954	11.8
1935..	.....	793,977	12.6

Number of Farm Service Customers

(As of December 31)

Region	1935	1934	1933	1932	1931	1930
United States	**793,977**	**743,954**	**713,558**	**705,075**	**698,786**	**649,919**
New England	61,547	58,006	55,725	52,923	52,237	48,996
Middle Atlantic	128,070	118,169	109,001	106,759	104,911	96,342
East North Central	196,624	181,261	172,467	170,421	166,893	151,113
West North Central	99,035	91,398	89,460	89,652	89,717	82,283
South Atlantic	58,558	53,307	50,558	49,080	47,958	42,539
East South Central	33,352	32,062	30,311	31,947	31,513	29,949
West South Central	24,694	22,883	22,371	22,653	22,170	21,438
Mountain	50,694	47,876	46,516	45,026	44,308	42,536
Pacific	141,403	138,992	137,149	136,614	139,079	134,723

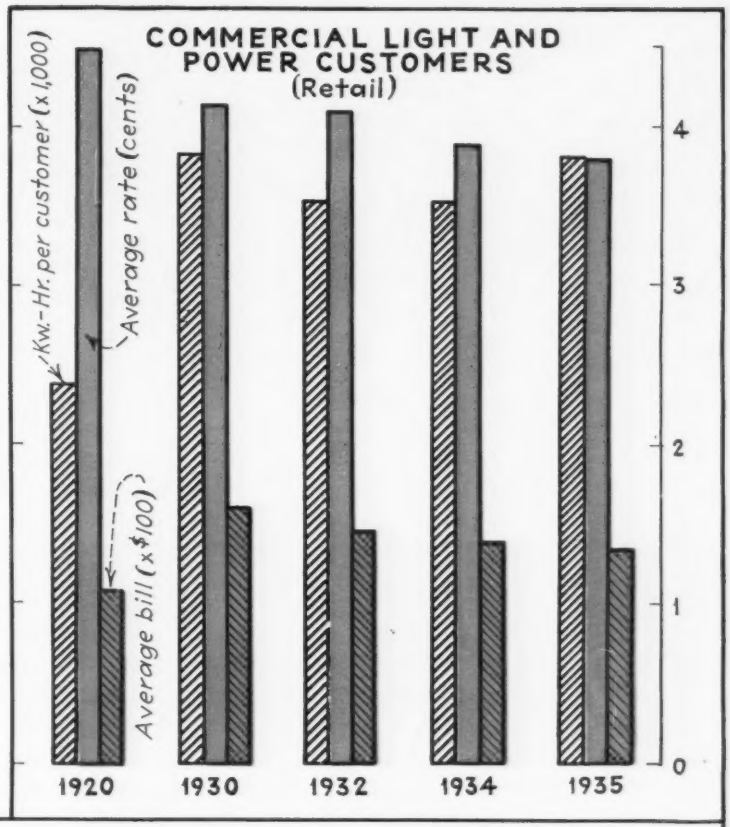
Now Aggregate 25,341,000

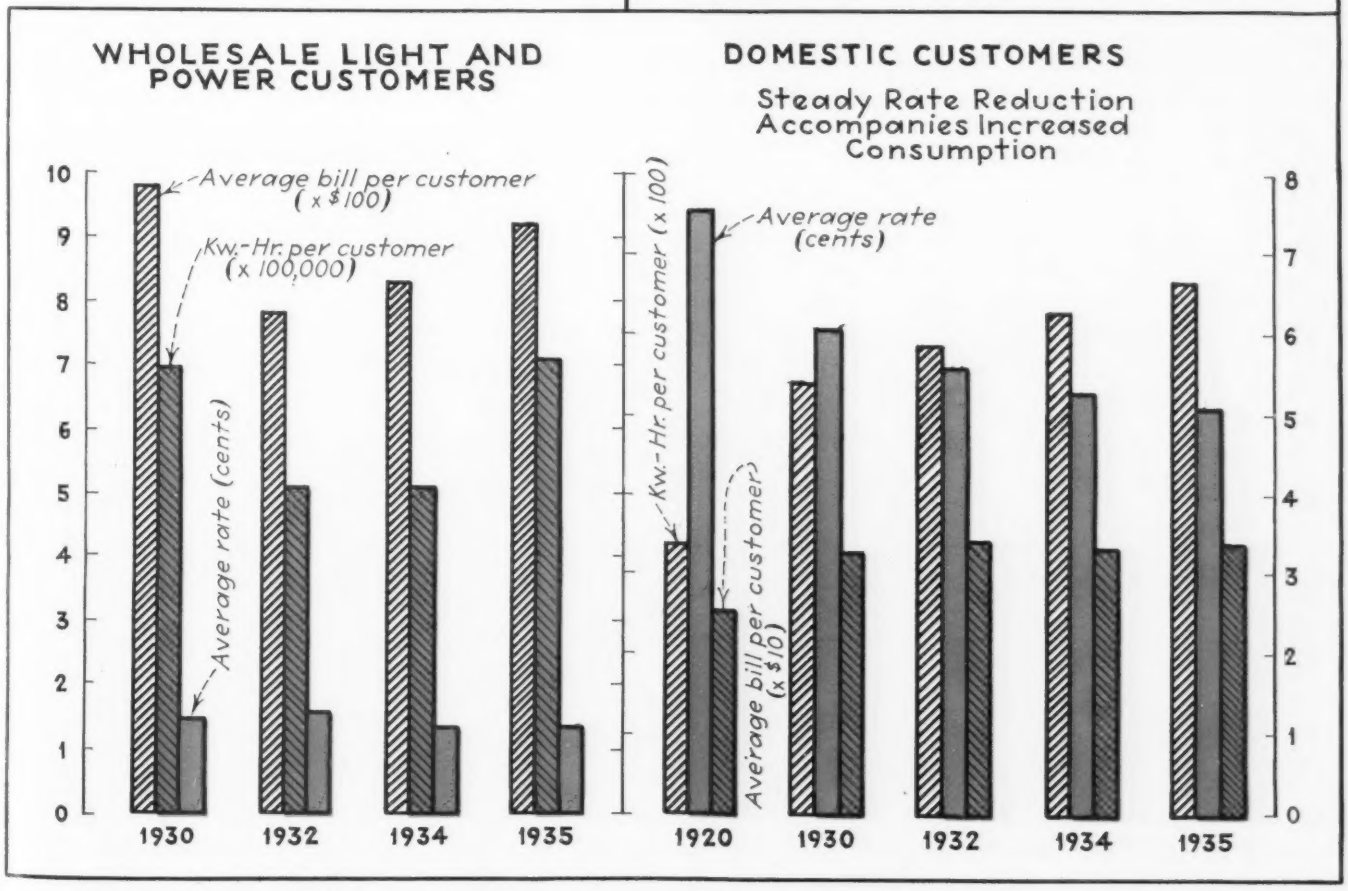
year before. In the table an apparent gain of 44,529 is indicated for the former group and a loss of 22,234 for the latter. Actually there was no such loss, nor any such gain, either. A change in classification in three West North Central States tossed 15,000 or 16,000 from one category to the other. This was enough not only to make the corresponding regional changes meaningless, but even to distort the national totals.

Small change in commercial customers

With that adjustment it is seen that commercial customers increased by only half of 1 per cent, or much less than farm and domestic. In most states the retail customers (commercial small light and power) increased moderately, although Alabama added 8 per cent. More than half the states show a decline in wholesale. If this has any significance it can hardly be serious, considering the way energy sales have been growing.

To make the figures for wholesale customers comparable with revenue and kilowatt-hours, as given elsewhere, the farms in the irrigation area —Southwest and West—must be included. That makes the total of wholesale and miscellaneous customers 581,633, for 1935, and 596,827 for 1934.





Average Annual Consumption per Customer, Rate and Bill—By Classes of Customer

CENTRAL-STATION CUSTOMERS at End of Year

Region or State	Total Number				Farms Served			Domestic (See Note)			Commercial Lighting and Small Power			Wholesale Power and Miscellaneous		
	1933	1934	1935	Change in 1935	1934	1935	Change in 1935	1934	1935	Change in 1935	1934	1935	Change in 1935	1934	1935	Change in 1935
UNITED STATES	**24,295,515**	**24,808,537**	**25,341,203**	**+532,666**	**743,954**	**793,977**	**+50,023**	**19,950,029**	**20,410,377**	**+460,348**	**3,727,478**	**3,772,007**	***+44,529**	**387,076**	**364,842**	***—22,234**
NEW ENGLAND	**2,207,673**	**2,229,165**	**2,269,342**	**+40,177**	**58,006**	**61,547**	**+3,541**	**1,821,271**	**1,858,364**	**+37,093**	**307,791**	**307,370**	**—421**	**42,097**	**42,061**	**—36**
Maine	194,563	194,697	196,111	+1,414	13,959	14,346	+387	144,034	144,665	+631	30,979	31,316	+337	5,725	5,784	+59
New Hampshire	121,181	124,196	128,672	+4,476	9,495	11,367	+1,872	95,253	97,634	+2,381	15,746	16,030	+284	3,702	3,641	—61
Vermont	80,445	80,295	80,787	+492	7,945	8,084	+139	58,245	58,528	+283	11,493	11,544	+51	2,612	2,631	+19
Massachusetts	1,172,230	1,186,303	1,206,023	+18,720	14,494	14,420	—74	985,318	1,005,713	+20,395	169,660	168,150	—1,510	17,831	17,740	—91
Rhode Island	189,529	187,417	190,018	+2,601	1,975	1,980	+5	158,536	161,128	+2,592	23,474	23,430	—44	3,432	3,480	+48
Connecticut	449,725	455,257	467,731	+12,474	10,138	11,350	+1,212	379,885	390,696	+10,811	56,439	56,900	+461	8,795	8,785	—10
MIDDLE ATLANTIC	**7,064,149**	**7,154,368**	**7,249,625**	**+95,257**	**118,169**	**128,070**	**+9,901**	**5,783,378**	**5,878,565**	**+95,187**	**1,152,525**	**1,143,340**	**—9,185**	**100,296**	**99,650**	**—646**
New York	3,834,212	3,852,596	3,885,015	+32,419	57,825	64,900	+7,075	3,058,571	3,092,415	+33,844	700,134	690,010	—10,124	36,066	37,690	+1,624
New Jersey	1,174,562	1,191,569	1,205,923	+14,354	15,162	15,800	+638	985,936	1,001,413	+15,477	155,647	156,080	+433	34,824	32,630	—2,194
Pennsylvania	2,055,375	2,110,203	2,158,687	+48,484	45,182	47,370	+2,188	1,738,871	1,784,737	+45,866	296,744	297,250	+506	29,406	29,330	—76
EAST NORTH CENTRAL	**5,669,117**	**5,807,177**	**5,946,823**	**+139,646**	**181,261**	**196,624**	**+15,363**	**4,767,761**	**4,889,237**	**+121,476**	**783,968**	**789,339**	**+5,371**	**74,187**	**71,623**	**—2,564**
Ohio	1,499,336	1,530,221	1,580,252	+30,131	48,048	53,100	+5,052	1,275,675	1,319,266	+43,591	187,172	188,698	+1,526	19,326	19,288	—38
Indiana	668,167	682,120	701,089	+18,969	23,476	25,178	+1,702	554,520	571,945	+17,425	89,839	89,938	+99	14,285	14,028	—257
Illinois	1,813,711	1,850,113	1,869,389	+19,276	28,379	30,877	+2,498	1,550,200	1,567,457	+17,257	248,874	248,373	—501	22,660	22,682	+22
Michigan	1,047,840	1,090,958	1,131,446	+40,488	42,152	46,490	+4,338	889,647	923,138	+33,491	155,392	158,158	+2,766	3,767	3,660	—107
Wisconsin	640,063	653,765	664,547	+10,782	39,206	40,979	+1,773	497,719	507,431	+9,712	102,691	104,172	+1,481	14,149	11,965	—2,184
WEST NORTH CENTRAL	**2,327,590**	**2,364,000**	**2,413,404**	**+49,404**	**91,398**	**99,035**	**+7,637**	**1,867,524**	**1,907,197**	**+39,673**	**358,712**	***380,144**	***+21,432**	**46,366**	***27,028**	***—19,338**
Minnesota	481,603	492,096	499,511	+7,415	13,783	13,947	+164	391,759	400,390	+8,631	66,552	*81,904	*+15,352	20,002	*3,270	*—16,732
Iowa	450,389	456,812	469,236	+12,424	32,047	33,570	+1,523	353,859	363,034	+9,175	66 427	68,193	+1,766	4,479	4,439	—40
Missouri	667,911	676,935	692,702	+15,767	17,893	22,340	+4,447	547,583	558,862	+11,279	106,720	107,335	+615	4,739	4,165	—574
North Dakota	69,197	70,595	72,179	+1,584	1,968	2,122	+154	49,522	50,754	+1,232	16,504	*17,670	*+966	2,601	*1,633	*—968
South Dakota	83,475	85,199	86,328	+1,129	2,939	2,940	+1	62,988	64,043	+1,055	15,161	*16,053	*+892	4,111	*3,292	*—819
Nebraska	236,331	238,615	241,480	+2,865	9,544	9,854	+310	188,646	190,533	+1,887	34,720	35,600	+880	5,705	5,493	—212
Kansas	338,684	343,748	351,968	+8,220	13,224	14,262	+1,038	273,167	279,581	+6,414	52,628	53,389	+1,761	4,729	4,736	+7
SOUTH ATLANTIC	**1,807,764**	**1,895,283**	**1,960,532**	**+65,249**	**53,307**	**58,558**	**+5,251**	**1,520,570**	**1,570,238**	**+49,668**	**296,312**	**306,359**	**+10,047**	**25,094**	**25,377**	**+283**
Delaware	49,734	50,507	51,189	+682	1,791	2,270	+479	39,882	40,172	+290	8,072	7,887	—185	762	860	+98
Maryland	332,569	345,460	353,064	+7,604	6,725	7,095	+370	418,292	430,311	+12,019	39,743	40,080	+337	1,898	1,889	—9
Dist. of Columbia	132,350	138,973	145,307	+6,334	66	63	—3				17,574	18,790	+1,216	135	143	+8
Virginia	267,917	277,175	287,013	+9,838	14,954	15,995	+1,041	213,751	220,032	+6,281	43,592	45,909	+2,317	4,878	5,077	+199
West Virginia	193,869	209,752	214,894	+5,142	3,647	4,335	+688	169,564	173,441	+3,877	33,035	33,560	+525	3,506	3,558	+52
North Carolina	264,213	269,342	278,344	+9,002	9,672	10,245	+573	213,468	219,842	+6,374	40,425	42,372	+1,947	5,777	5,885	+108
South Carolina	109,617	112,300	117,777	+5,477	3,796	3,906	+110	85,466	88,942	+3,476	21,150	23,022	+1,872	1,888	1,907	+19
Georgia	212,936	228,078	241,017	+12,939	6,956	8,416	+1,460	172,739	182,464	+9,725	46,636	48,356	+1,720	1,747	1,781	+34
Florida	244,559	263,696	271,927	+8,231	5,700	6,233	+533	207,408	215,034	+7,626	46,085	46,383	+298	4,503	4,277	—226
EAST SOUTH CENTRAL	**791,963**	**825,464**	**856,160**	**+30,696**	**32,062**	**33,352**	**+1,290**	**635,454**	**658,657**	**+23,203**	**143,784**	**149,465**	**+5,681**	**14,164**	**14,686**	**+522**
Kentucky	277,213	283,745	289,862	+6,117	8,480	8,995	+515	223,148	227,408	+4,260	43,550	44,399	+849	8,567	9,060	+493
Tennessee	241,912	256,242	267,562	+11,320	9,727	11,871	+2,144	200,119	208,581	+8,462	43,794	44,459	+665	2,602	2,651	+49
Alabama	177,991	188,517	196,929	+8,412	11,053	9,968	—1,085	142,281	148,938	+6,657	34,196	37,023	+2,827	987	1,000	+13
Mississippi	94,847	96,960	101,807	+4,847	2,802	2,518	—284	69,906	73,730	+3,824	22,244	23,584	+1,340	2,008	1,975	—33
WEST SOUTH CENTRAL	**1,263,108**	**1,311,544**	**1,356,399**	**+44,855**	**22,883**	**24,694**	**+1,811**	**1,021,519**	**1,061,669**	**+40,150**	**238,651**	**241,168**	**+2,517**	**28,491**	**28,868**	**+377**
Arkansas	117,662	121,582	122,903	+1,821	2,943	3,563	+620	91,118	91,382	+264	25,042	25,280	+238	2,479	2,678	+199
Louisiana	200,016	207,550	220,913	+13,363	2,826	3,203	+377	166,389	179,376	+12,987	35,068	35,026	—42	3,267	3,308	+41
Oklahoma	269,858	278,509	282,505	+3,996	5,648	5,848	+200	213,381	217,912	+4,531	47,193	46,842	—351	12,287	11,903	—384
Texas	675,572	703,903	730,078	+26,175	11,466	12,080	+614	550,631	572,999	+22,368	131,348	134,020	+2,672	10,458	10,979	+521
MOUNTAIN	**634,349**	**648,303**	**663,245**	**+14,942**	**47,876**	**50,694**	**+2,818**	**496,276**	**508,185**	**+11,909**	**92,989**	**92,856**	**—133**	**11,162**	**11,510**	**+348**
Montana	87,194	89,091	93,795	+4,704	2,768	2,891	+123	70,043	74,410	+4,367	15,629	16,010	+381	651	484	—167
Idaho	78,517	82,326	86,490	+4,164	13,433	14,880	+1,447	56,594	59,518	+2,924	11,653	11,458	—195	646	634	—12
Wyoming	32,776	32,307	32,882	+575	527	574	+47	25,972	26,717	+745	5,254	5,048	—206	554	543	—11
Colorado	204,220	206,687	208,051	+1,364	7,145	7,319	+174	163,527	163,719	+192	29,498	29,647	+149	6,517	7,366	+849
New Mexico	34,754	35,186	35,618	+432	1,350	1,374	+24	26,758	27,247	+489	6,371	6,320	—51	707	677	—30
Arizona	70,268	72,572	74,394	+1,822	5,577	6,133	+556	55,296	56,770	+1,474	9,982	10,202	+220	1,717	1,289	—428
Utah	109,128	111,913	113,415	+1,502	16,130	16,576	+446	84,016	85,421	+1,405	11,463	10,965	—498	304	453	+149
Nevada	17,492	18,221	18,600	+379	946	947	+1	14,070	14,383	+313	3,139	3,206	+67	66	64	—2
PACIFIC	**2,529,802**	**2,573,233**	**2,625,673**	**+52,440**	**138,992**	**141,403**	**+2,411**	**2,036,276**	**2,078,265**	**+41,989**	**352,746**	**361,966**	**+9,220**	**45,219**	**44,039**	**—1,180**
Washington	424,377	427,883	438,306	+10,423	40,060	42,287	+2,227	329,524	338,254	+8,660	54,882	55,265	+383	3,347	2,500	—847
Oregon	236,927	243,958	246,458	+2,500	17,839	18,368	+529	188,863	190,816	+1,953	34,229	34,462	+233	3,027	2,812	—215
California	1,868,498	1,901,392	1,940,909	+39,517	81,093	80,748	—345	1,517,819	1,549,195	+31,376	263,635	272,239	+8,604	38,845	38,727	—118

Note—**Domestic,** combined with farms in non-irrigated areas: 1934, **20,484,232**; 1935, **20,987,563.** Wholesale, with farms in W.S.C., Mt. Pac.: 1934, **593,827**; 1935, **581,633.** These correspond with revenue and energy totals published elsewhere and with "domestic" in previous years. **Farms** in non-irrigated areas (first 6 regions): 1934, **534,203**; 1935, **577,186.** Farms in irrigated areas: 1934, **209,751**; 1935, **216,791.** See text. *Not comparable with previous years, due to changes in classification.

Central Stations, 33,900,000 Kw. Generated 93,575,000,000 Kw.-Hr.

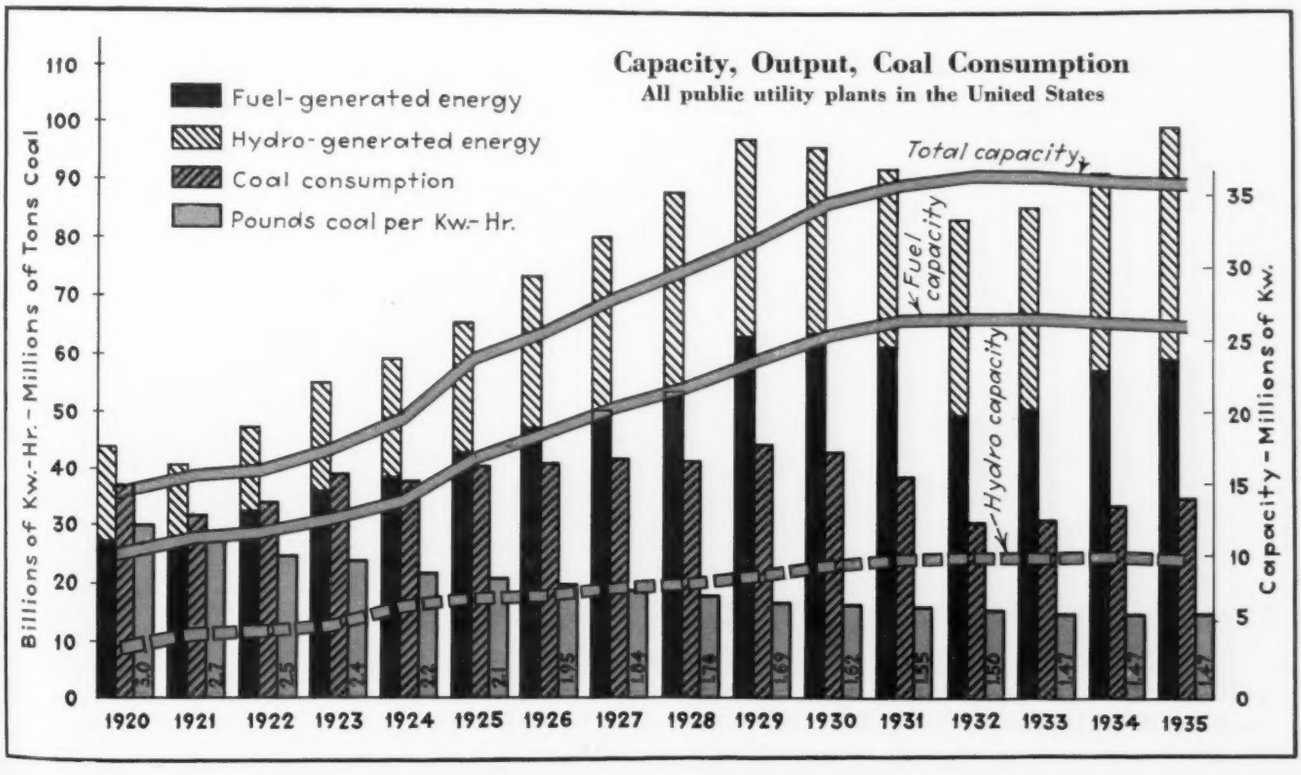
Capacity 35,800,000 Kw.- Generation 98,670,000,000

CENTRAL stations had a capacity at the end of 1935 of 33,900,000 kw. In addition, energy is generated for public use by electric railway and electrified railroads, Bureau of Reclamation and certain other plants. Their inclusion brings the total to 35,803,628 kw. It will be seen that there is a difference of about 1,900,000 kw. between "central stations" and "all public utilities." The former generated 93,575,000,000 kw.-hr. during 1935 and the larger group, which includes the smaller, produced 98,670,000,000 kw.-hr. Like other year-end figures, these are subject to later revision, which may carry the grand total for all public utilities closer to 100,000,000,000 kw.-hr., the central light and power stations contributing about 95 per cent. This was the largest yearly output ever produced in the United States.

Compared with 1934, central station output gained 9 per cent. Recovery from the 1932 minimum of 77,868,000,000 kw.-hr. was 20 per cent. The rise over the previous peak, in 1929, was better than 2 per cent. That applies to the year as a whole. The increase for the second half year, in which the margin of capacity is determined, was much greater, ranging from 7 to 9 per cent.

Fortunately for economy, water power was abundant and nearly 40 per cent of the output was thus generated. No records were broken as to output from fuel. Had the year been a dry one, the steam plants might easily have had to furnish a bigger output than ever before. Coal consumption was stepped up with energy production from fuels to 32,600,000 tons.

Prime mover capacity in central stations is estimated at 47,630,500 hp., of which 32,910,000 hp. is steam, 13,723,400 hp. is water power and 997,100 hp. is internal combustion engines. Comparative figures for the end of 1934 are: Total, 47,719,400 hp.; steam, 33,161,000 hp.; water, 13,622,400 hp.; internal combustion, 936,000 hp., including small plants not covered by the Geological Survey. In



parable with previous years, due to changes in classification.

GENERATOR RATING—Public Utility Power Plants*

Central stations, municipal, railway and other

December, 1935. By Courtesy of United States Geological Survey

Division and State	Companies	Plants	Total Capacity, Kw.	Generator Capacity of Plants Operated By										
				One Type of Prime Mover						Combination of Two or More Types				
				Water Power		Steam Power		Internal Comb. Engines		Total		Water Power	Steam Power	Int. Comb Engines
				No.	Cap.	No.	Cap.	No.	Cap.	No.	Cap.	Cap.	Cap.	Cap.
United States	**1,640**	**3,855**	**35,803,628**	**1,360**	**9,594,212**	**1,289**	**24,831,150**	**919**	**454,218**	**287**	**924,048**	**265,552**	**546,732**	**111,764**
New England	**141**	**326**	**2,908,477**	**223**	**822,752**	**66**	**1,963,805**	**7**	**6,461**	**30**	**115,459**	**25,033**	**87,640**	**3,786**
Maine	28	79	263,584	66	210,415	6	49,730	2	707	5	2,732	1,296	800	636
New Hamp're	15	54	280,303	40	218,978	5	35,705	1	480	8	25,140	4,150	20,050	940
Vermont	23	72	175,041	63	159,629	3	10,000	0	0	6	5,412	2,502	2,910	0
Massachusetts	51	76	1,337,344	31	154,500	35	1,121,890	3	4,049	7	56,905	14,405	41,290	1,210
Rhode Island	3	7	242,950	3	1,750	4	241,200	0	0	0	0	0	0	0
Connecticut	21	38	609,255	20	77,480	13	505,280	1	1,225	4	25,270	2,680	22,590	0
Mid. Atlantic	**149**	**409**	**9,160,902**	**205**	**1,407,373**	**156**	**7,564,615**	**22**	**23,599**	**26**	**165,315**	**123,280**	**37,290**	**4,745**
New York	77	246	5,378,472	166	1,135,644	61	4,217,295	5	12,310	14	13,223	5,465	4,235	3,523
New Jersey	13	26	1,075,955	3	950	17	1,064,950	3	2,140	3	7,915	5,100	2,700	115
Pennsylvania	59	137	2,706,475	36	270,779	78	2,282,370	14	9,149	9	144,177	112,715	30,355	1,107
E. No. Central	**313**	**661**	**7,901,227**	**260**	**626,941**	**309**	**7,028,134**	**49**	**25,672**	**43**	**220,480**	**19,454**	**189,433**	**11,593**
Ohio	70	107	2,152,297	8	9,380	86	2,064,601	9	3,996	4	74,320	2,770	71,350	200
Indiana	56	99	1,041,187	19	29,485	69	998,668	8	5,952	3	7,082	3,380	3,260	442
Illinois	62	103	2,314,025	14	42,315	71	2,182,609	12	3,781	6	85,320	3,910	77,905	3,505
Michigan	63	185	1,558,053	119	313,240	43	1,226,540	13	6,949	10	11,324	2,551	4,420	4,353
Wisconsin	62	167	835,665	100	232,521	40	555,716	7	4,994	20	42,434	6,843	32,498	3,093
W. No. Central	**396**	**778**	**2,694,377**	**112**	**468,275**	**254**	**1,930,421**	**341**	**151,874**	**71**	**143,807**	**14,633**	**95,472**	**33,702**
Minnesota	50	124	587,684	41	151,850	53	421,189	18	6,707	12	7,938	1,858	2,837	3,243
Iowa	79	164	596,907	27	147,400	65	348,056	55	26,662	17	74,789	6,903	60,011	7,875
Missouri	63	106	708,746	7	149,745	40	526,100	52	27,287	7	5,614	0	1,879	3,735
North Dakota	17	37	67,717	0	0	17	62,223	19	4,944	1	550	0	250	300
South Dakota	27	54	66,328	5	4,000	8	33,525	37	15,895	4	12,908	0	9,340	3,568
Nebraska	78	157	258,623	24	8,865	39	206,507	73	23,721	21	19,530	3,905	5,113	10,512
Kansas	82	136	408,372	8	6,415	32	332,821	87	46,658	9	22,478	1,967	16,042	4,469
So. Atlantic	**165**	**433**	**4,357,580**	**150**	**1,883,015**	**151**	**2,293,134**	**96**	**44,773**	**36**	**136,658**	**45,535**	**79,597**	**8,526**
Delaware	6	6	8,515	0	0	4	7,600	2	915	0	0	0	0	0
Maryland	14	25	611,612	4	271,985	11	334,460	8	2,997	2	2,170	0	1,400	770
Dist. of Col.	2	3	222,400	1	2,400	2	220,000	0	0	0	0	0	0	0
Virginia	30	75	467,874	34	81,988	18	304,949	14	5,659	9	75,278	15,069	59,550	659
W. Virginia	17	38	568,974	6	55,920	21	507,725	7	4,145	4	1,184	535	62	587
N. Carolina	30	83	1,000,707	49	643,487	22	343,100	6	3,919	6	10,201	6,451	2,000	1,750
S. Carolina	14	42	644,106	25	489,738	9	130,765	4	680	4	22,923	16,200	6,573	150
Georgia	21	68	469,491	28	323,247	29	128,234	7	1,758	4	16,252	10,180	5,412	660
Florida	34	93	363,901	3	14,250	35	316,301	48	24,700	7	8,650	100	4,600	3,950
E. So. Central	**85**	**212**	**1,661,013**	**31**	**880,536**	**89**	**712,559**	**79**	**25,250**	**13**	**42,668**	**23,415**	**17,149**	**2,104**
Kentucky	20	43	331,023	3	104,860	26	221,597	9	2,701	5	1,865	315	825	725
Tennessee	27	60	425,711	17	186,386	26	196,752	13	3,491	4	39,082	23,100	15,300	682
Alabama	12	38	839,726	11	589,290	16	246,090	11	4,346	0	0	0	0	0
Mississippi	26	71	64,553	0	0	21	48,120	46	14,712	4	1,721	0	1,024	697
W. So. Central	**170**	**424**	**1,774,656**	**22**	**99,290**	**129**	**1,504,916**	**246**	**117,490**	**27**	**52,960**	**950**	**32,689**	**19,321**
Arkansas	20	60	146,924	5	66,855	30	70,891	20	4,929	5	4,249	0	1,544	2,705
Louisiana	34	64	311,343	0	0	12	288,200	50	21,718	2	1,425	0	712	713
Oklahoma	58	100	338,465	1	275	31	300,900	60	32,330	8	4,960	200	1,747	3,013
Texas	58	200	977,924	16	32,160	56	844,925	116	58,513	12	42,326	750	28,686	12,890
Mountain	**138**	**326**	**1,195,429**	**152**	**774,539**	**81**	**358,586**	**64**	**25,195**	**29**	**37,109**	**5,816**	**5,592**	**25,301**
Montana	7	28	310,409	15	299,360	6	7,665	3	1,448	4	1,936	268	643	1,025
Idaho	18	47	228,130	40	224,140	3	1,100	1	1,300	3	1,590	980	0	610
Wyoming	20	35	43,527	8	13,580	17	26,307	9	2,940	1	700	400	300	0
Colorado	30	71	235,909	21	52,602	33	174,863	12	6,150	5	2,294	1,344	175	775
New Mexico	17	33	86,813	1	200	12	76,861	16	5,301	4	4,451	808	1,617	2,026
Arizona	19	44	143,621	11	87,050	9	30,790	17	4,870	7	20,911	0	2,657	18,254
Utah	20	56	135,938	49	89,212	1	41,000	3	1,931	3	3,795	1,620	0	2,175
Nevada	7	12	11,082	7	8,395	0	0	3	1,255	2	1,432	396	600	436
Pacific	**83**	**286**	**4,149,967**	**205**	**2,631,491**	**54**	**1,474,980**	**15**	**33,904**	**12**	**9,592**	**4,436**	**1,470**	**3,686**
Washington	29	71	920,134	47	707,384	14	208,020	3	603	7	4,127	2,206	970	951
Oregon	23	66	338,246	41	175,424	16	156,010	5	1,712	4	5,100	2,030	500	2,570
California	31	149	2,891,587	117	1,748,683	24	1,110,950	7	31,589	1	365	200	0	165

*Includes all plants generating energy for public use, having a monthly output of 10,000 kw.-hr. or more.

†Only companies that have generating plants. Excludes those purchasing all their energy. Includes municipalities.

the table on page 66 the generator rating of public utilities is given by type of prime mover for each state. The 3,855 plants include 1,360 water power plants, with 9,594,212 kw.; 1,289 steam, with 24,831,150 kw.; 919 internal combustion, with 454,218 kw., and 287 combination plants, with 924,048 kw., divided as shown in the table. Total steam is 25,377,882 kw., or 70.9 per cent of the total; water power is 9,859,764 kw., or 27.5 per cent; internal combustion is 565,982 kw., or 1.6 per cent.

Capacity has decreased by a quarter million kilowatts during the past three years. This is the net change. Since there have been some additions, the total retirement must have been greater. The decrease was confined to capacity driven by steam, where it amounted to 470,000 kw. That driven by water power and internal combustion engines increased.

The rating of internal-combustion-engine-driven generators has doubled since 1928. No other type of prime mover has had similar growth. The aggregate is still small, but these units seem to be finding favor in small plants.

To show the combined results of increased output and increased capacity on the station load, the hour-use of average capacity has been computed for each year since 1919. This use averaged 2,750 hours in 1935, having climbed from 2,320 in 1932, but it remains less than in 1929—when it reached 3,160 hours—by a considerable margin. At the recent rate of growth that margin will be absorbed within the year.

Oil and gas fuels are more prominent than they were a few years ago. Computed on the basis of coal equivalents in the report of the U. S. Geological Survey for 1934, oil in 1935 constituted 6.8 per cent; gas, 12.6 per cent, and coal, 80.6 per cent of the fuel. The Survey gives 3.85 bbl. of oil and 23,100 cu.ft. of gas as the equivalent of a ton of coal.

The rate of fuel consumption again averaged 1.47 lb. of coal per kilowatt-hour, as in the two preceding years. (A preliminary figure for 1934 of 1.45 was originally announced by the Geological Survey, but this was subsequently changed to 1.47.) No changes in plant or operating conditions have occurred during the past few years from which any important change in the fuel rate might be expected.

Central Station Capacity, Output

Year	Capacity (Kw.)	Output (Mill. Kw.-Hr.) Total	Output (Mill. Kw.-Hr.) Fuel	Fuel Consumption Coal[1]	Fuel Consumption Oil[2]	Fuel Consumption Gas[3]
1927	25,811,305	74,686	45,968	37,501	7,146	66
1928	28,698,305	82,927	49,419	37,593	6,852	77
1929	29,558,637	91,421	59,031	41,406	9,740	112
1930	31,976,138	89,952	59,388	39,702	8,950	119
1931	33,483,821	86,312	57,742	35,690	7,899	138
1932	34,010,137	77,868	45,991	27,589	7,269	107
1933	33,970,302	79,983	47,533	28,039	9,446	101
1934	33,932,639	85,970	53,808	30,942	10,076	125
1935*	33,900,100	93,575	56,575	32,600	11,200	125

*Estimated on 10 months' operations. [1]Thousands of tons. [2]Thousands of barrels. [3]Billions of cubic feet.

Capacity (Kw.) of Generators

In plants generating electricity for public use* in the United States, by type of prime mover

(United States Geological Survey)

Year Dec. 31	Water Power	Steam	Internal-Combus. Engines	Total
1920	3,674,541	9,823,622	87,759	13,585,922
1921	4,151,662	11,209,369	96,095	15,448,126
1922	4,229,194	11,643,695	102,398	15,975,287
1923	4,395,205	12,949,117	114,045	17,458,367
1924	5,176,565	14,213,847	126,788	19,517,200
1925	5,976,786	17,485,855	185,859	23,648,500
1926	6,609,484	18,597,984	190,917	25,398,385
1927	7,201,425	19,646,909	203,863	27,052,197
1928	8,116,627	21,214,580	298,495	29,629,702
1929	8,316,591	23,255,692	380,113	31,952,396
1930	9,075,878	24,768,358	419,708	34,263,944
1931	9,670,922	25,467,597	451,553	35,590,072
1932	9,725,096	25,847,184	488,313	36,060,593
1933	9,773,302	25,765,739	499,224	36,038,265
1934	9,788,664	25,560,171	524,990	35,873,825
1935†	9,859,764	25,377,882	565,982	35,803,628

*Central stations, municipal, electric railway, electrified railroad, Bureau of Reclamation and other. †December 1.

Output, Capacity and Fuel Consumption—All Public Utility Plants

Central stations, electric railway, electrified railroad, public works and other plants generating energy for public use

These statistics relate to *all* plants (not exclusively to central stations) having an output of 10,000 kw.-hr. per month, comprised in the totals reported each month by the U. S. Geological Survey

Year	Energy Generated (Millions of Kw.-Hr.) Total	From Fuel†	From Water Power	Capacity End of Year (Kw.)	Hours Use of Average Capacity	Fuel Consumed: Coal (Millions of Tons)	Oil (Millions of Bbl.)	Gas (Billions of Cu. Ft.)	Coal Plus Coal Equivalent of Oil and Gas‡ (Millions of Tons)	Pounds of Coal per Kw.-Hr.
1919	38,921	24,315	14,606	13,093,972	2,970	35.10	11.05	21.41	38.88	3.2
1920	43,555	27,405	16,150	13,585,922	3,265	37.12	13.12	24.70	41.42	3.0
1921	40,975	26,005	14,970	15,448,126	2,820	31.59	12.05	23.72	35.24	2.7
1922	47,654	30,447	17,207	15,975,287	3,030	34.18	13.20	27.17	38.00	2.5
1923	55,665	36,322	19,343	17,458,367	3,340	38.97	14.68	31.43	43.52	2.4
1924	59,014	39,044	19,969	19,517,200	3,200	37.56	16.63	48.44	43.13	2.2
1925	65,870	43,514	22,356	23,648,500	3,050	40.22	10.25	46.52	44.78	2.1
1926	73,791	47,602	26,189	25,398,385	3,010	41.31	9.40	53.21	45.86	1.95
1927	80,205	50,330	29,875	27,052,197	3,060	41.89	6.78	62.92	45.91	1.84
1928	87,850	53,154	34,696	29,629,702	3,065	41.35	7.16	77.33	46.39	1.76
1929	97,352	62,723	34,629	31,952,396	3,160	44.94	10.12	112.71	52.57	1.69
1930	95,986	62,915	33,021	34,263,944	2,900	42.90	9.26	120.29	50.65	1.62
1931	91,729	61,126	30,603	35,590,072	2,625	38.73	8.12	139.33	47.13	1.55
1932	83,153	49,055	34,098	36,060,593	2,320	30.29	7.97	107.88	36.60	1.50
1933	85,402	50,674	34,727	36,038,465	2,365	30.58	9.94	102.60	37.16	1.47
1934	91,150	57,092	34,058	35,873,825	2,530	33.56	10.38	127.90	41.79	1.47
1935*	98,670	58,720	39,950	35,803,628	2,750	34.74	10.85	123.85	42.92	1.47

*Estimated on basis of ten months' operations. †Includes output by use of wood as fuel. ‡Wood not included.

Utilities Finance at 3.83 per Cent

Bond Issues

Financing at Highest Point Since 1931 July the Best Month at $291,091,000

WHATEVER may have been the tribulations of the public utilities in other respects, last year was exceptional in point of financing by means of mortgage bonds, with the total just over $1,000,000,000. Debenture issues and notes added more than $59,000,000 to this total. Moreover, this money was raised at the most advantageous interest rates in the entire history of the power industry, not excepting the best days of the boom years, when 4 and 4½ per cent bonds gradually ceased to be a rarity.

The year's flotations—far and away the largest aggregate since 1931—was achieved in the face of the fight for federal regulation of holding companies. This attack, nevertheless, played no minor part in the market. For example, the December 1 deadline for utility registration, provided in the Public Utilities Act of 1935 as finally enacted, became an almost insurmountable obstacle to new financing in the final month of the year. Previously, and particularly during November, the deadline acted as a spur to drive onto the market all issues which had received registration certificates from the Securities and Exchange Commission.

The Washington campaign to eliminate holding companies, at the same time, may have had something to do with the preponderance of mortgage issues, with operating companies the principal borrowers, for it is doubtful if holding company obligations would have found a very warm reception with investors under the circumstances. However, it was the unusual state of the money market which really dictated underlying liens with mortgage security, because there were few top-

Financing Exceeded $1,000,000,000

Mortgage Bonds (Average Yield 3.83 per cent)

No. of Issues	Range of Yield	Amount of Issues
8	3.30–3.50	$238,091,000
6	3.53–3.64	97,451,000
6	3.75–3.80	140,534,000
7	3.84–3.89	217,010,900
7	3.91–4.00	189,955,500
7	4.01–4.57	77,663,300
5	5.00–5.85	32,970,000
1	6.50	500,000
2	Placed privately	10,425,000
49 issues		$1,004,609,700
Debentures		
3	0.875–5.00	$42,000,000
1	6.00	7,500,000
4 issues		$49,500,000
Notes		
1 issue	3.50–5.00	$9,570,000
		$9,570,000
Total Financing		$1,063,670,700
Refunding		$1,037,174,589
New capital		26,496,111

Obligations Maturing in 1936

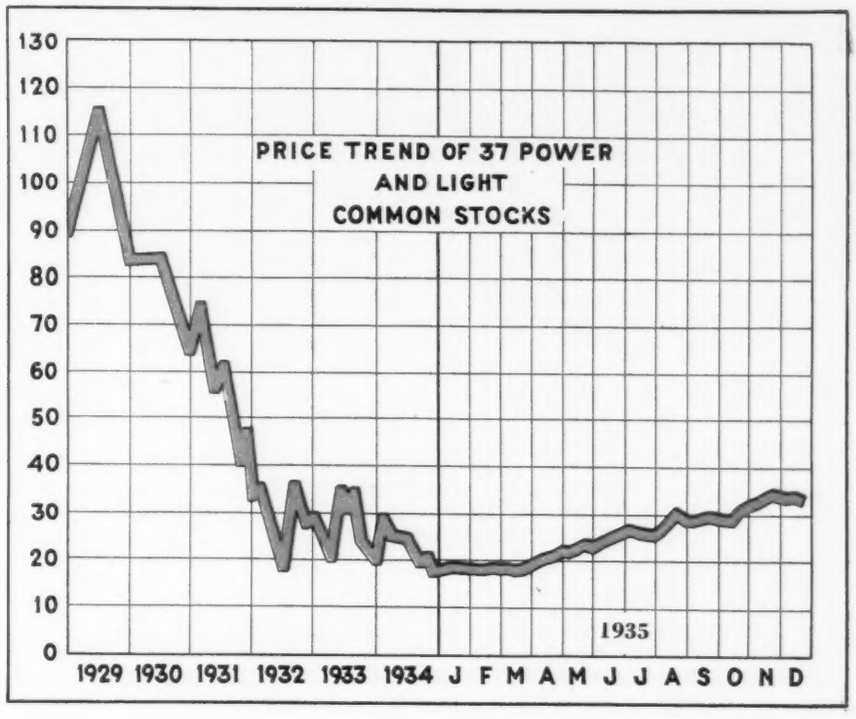
January 1	
Consumers Elec. L. & P. 1st 5s	$1,885,000
Consumers Pwr. 1st lien & ref. 5s	15,672,000
Flambeau Pwr. 1st series 6s, A	12,500
Northern New York Pwr., 1st 6s	50,000
Oxford Electric 1st & ref. 5s	175,000
Winston-Salem Pwr. 1st 6s	39,000
	$17,833,500
February 1	
Elko Lamoille Pwr., 1st series 7	$5,000
Ironwood & Bessemer Ry. & Lt. 1st 5s	1,179,000
Seattle Lighting deb. 6s	1,229,000
February 2	
Battle Creek Power 1st 5s	41,000
February 15	
New England Pwr. Assn. 5½ ser. notes	360,000
	$2,814,000
March 1	
Long Island Lighting 1st 5s	$4,492,700
April 1	
Charlotte Elec. Ry., Lt. & Pwr. ref. & ext. 5s	$351,000
Columbus Power 1st 5s	3,019,000
East Missouri Power 1st 6s	296,500
North Amer. Lt. & Pwr. 5% notes	2,000,000
Southern Iowa Elec. 1st 6s	228,900
April 15	
Edison Elec. Illg. Boston 5% notes	16,000,000
	$21,895,400
May 1	
Great Lakes Power 1st 6s	$150,000
Rockville Gas & Elec. 1st 5s	300,000
	$450,000
June 1	
Iowa Southern Util. 6% notes	$100,000
July 1	
Columbia (S. C.) Ry., Gas & Elec. 1st 5s	$1,449,500
Indiana Service eq. 6s E	32,000
Janesville Elec. 1st & ref. (now 1st) 5s	10,000
Laurel Light & Ry. 1st 6s	117,000
Potomac Elec. Power cons. 5s	3,922,000
	$5,530,500
August 1	
Appalachian Power sec. 7s	$2,500,000
Kanawha Trac. & Elec. 1st & ref. 5s, A	1,700,000
Roosevelt Water Pwr. & Lt. 1st 6s	1,000
	$4,201,000
September 1	
Redlands Water & Pwr. 1st closed 5½s	$2,000
October 1	
Chicago Dist. El. Gen. deb.	$850,000
November 1	
Paul Smith's Elec. Lt. & Pwr. & R.R. 1st 5s	$500,000
November 15	
Arangas Pass-Rockport Lt., Ice & Pwr. 1st 6s	18,000
	$518,000
December 1	
Iowa South. Util. 6% notes	$50,000
Madison County Lt. & Pwr. 1st 5s	541,000
	$591,000
Total for the year	$59,278,100

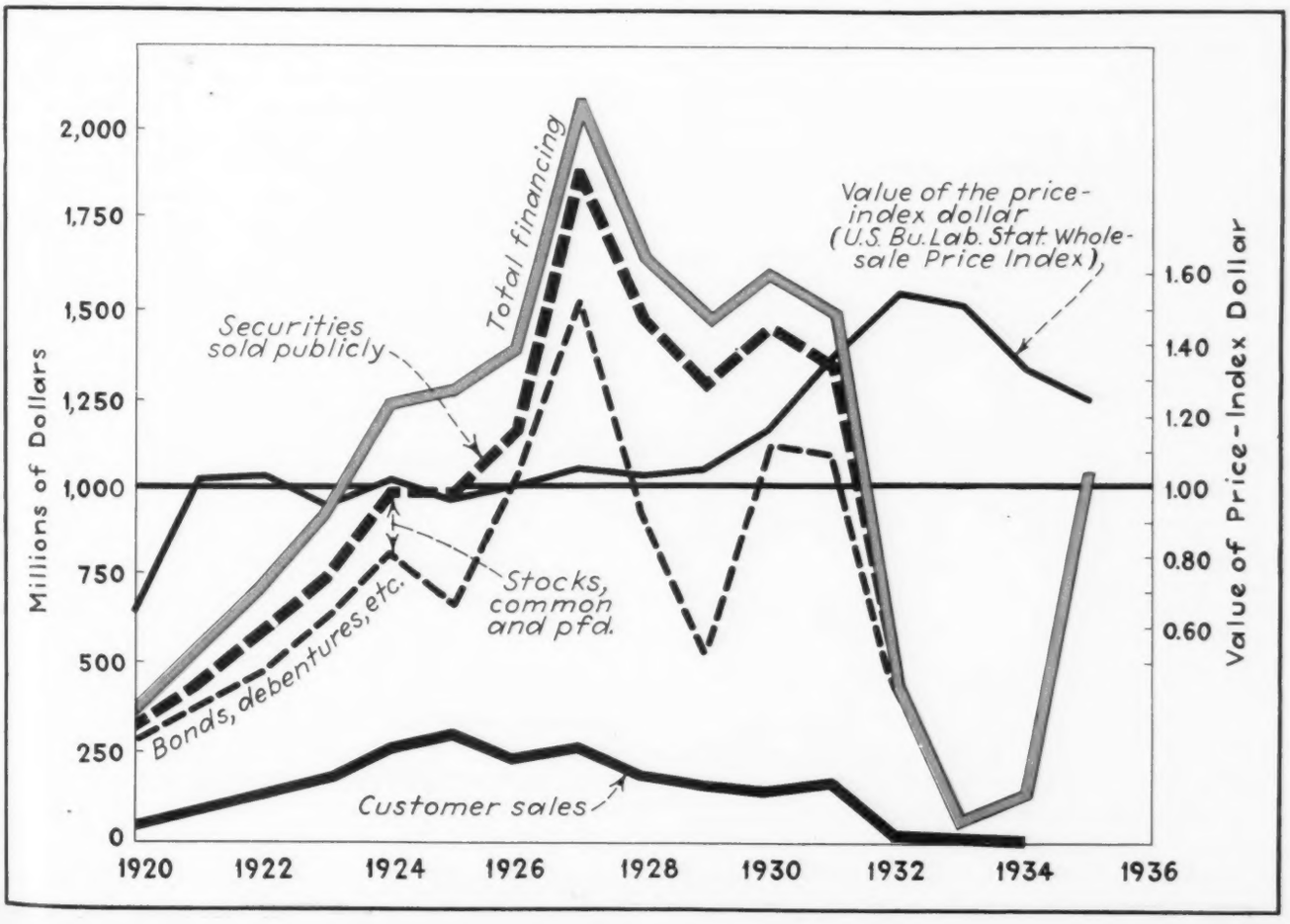
Total $1,063,000,000 in 1935

grade investments available, while vast sums sought placement, with the result that yields were driven to amazingly low levels. Thus it was that the public utilities undertook their most ambitious refunding program and accomplished it at the unprecedented figure (based on offering prices) of an average 3.83 per cent yield basis. Two issues were sold to yield only 3.30 per cent.

Some very large issues, with yields crowding the 3¾ per cent mark, made their appearance in the first half of 1935. The five months from July to November, inclusive, however, saw the real flood of new financing, nearly $772,750,000 of the year's $1,063,000,000 making its appearance during that five-month interval. July set the high mark at $291,091,000, while November was second at $211,153,400. April's $83,440,000 was the highest in the first half of the year.

The year's largest borrower was





OUTSTANDING FACTS

Figures are on electric light and power industry for the year's operations or as of the end of each year

	1928	1929	1930	1931	1932	1933	1934	*1935
CAPITAL invested ($1,000)	10,300,000	11,100,000	11,800,000	12,400,000	12,600,000	12,800,000	12,900,000	13,100,000
Securities sold ($1,000)	1,653,180	1,468,895	1,591,986	1,491,742	465,921	56,248	129,815	1,063,671
By investment houses ($1,000)	[3]1,471,498	[3]1,315,459	[3]1,452,854	[3]1,341,742	[3]1,341,742	[3]55,873	[2]129,815	[2]1,063,671
Direct to customers ($1,000)	181,682	153,436	139,132	150,000	18,000	375	.....	.....
REVENUE, elec. serv. ($1,000)	1,941,955	2,105,900	2,151,150	2,125,110	1,979,990	1,906,110	1,980,460	2,068,500
From ult. consumers ($1,000)	1,784,309	1,938,520	1,990,955	1,975,944	1,832,596	1,773,416	1,837,046	1,923,500
Domestic ($1,000)	571,620	618,799	664,441	678,611	669,200	656,570	677,697	709,200
Small light and pwr. ($1,000)	519,957	555,640	575,598	564,524	528,861	499,684	511,682	536,600
Large light and pwr. ($1,000)	549,989	613,171	590,992	570,127	476,451	465,191	495,657	532,500
Munic. ltg. and misc. ($1,000)	90,695	98,646	107,841	114,045	113,952	109,462	107,446	101,000
Railways, railroads ($1,000)	52,048	52,264	52,083	48,637	44,132	42,809	44,564	44,200
Other sources ($1,000)	157,646	167,380	160,195	149,166	147,394	132,694	143,414	145,000
EXPENDITURES								
Additions, extensions ($1,000)	786,977	866,344	960,890	633,415	260,000	180,000	170,000	237,463
Operating, total[1] ($1,000)	866,350	934,890	946,180	913,910	[7]817,950	795,811	857,200	905,100
Salaries and wages ($1,000)	.....	405,000	423,000	392,000	[7]323,880	292,000	316,000	328,000
Taxes ($1,000)	167,700	176,800	192,200	197,200	[7]205,151	216,300	246,300	260,000
ENERGY (1,000,000 kw.-hr.)								
Output, central stations	82,927	91,421	89,952	86,312	77,868	79,983	85,970	93,575
From fuel	49,419	59,031	59,388	57,742	45,991	47,533	53,808	56,575
From water power	33,508	32,390	30,562	28,570	31,877	32,450	32,162	37,000
Total; incl. imported and purch	83,394	92,757	91,957	88,400	79,505	81,913	87,577	95,374
SYSTEMS, STATIONS								
Number of establishments	4,063	[8]2,801	[8]2,755	[8]2,596	[7]3,429	.....	.....	.....
Commercial establishments	2,153	[8]1,480	[8]1,379	[8]1,308	[7]1,627	.....	.....	.....
Municipal establishments	1,910	[8]1,321	[8]1,376	[8]1,288	[7]1,802	.....	.....	.....
Companies generating	2,394	[8]1,699	[8]1,575	[8]1,686	[7]1,788	.....	.....	.....
Companies purch. all energy	1,669	[8]1,102	[8]1,180	[8]910	[7]1,641	.....	.....	.....
No. 100,000,000 kw.-hr. systems	135	137	142	142	138	137	.....	.....
Transmission (circuit miles)	[6]173,797	[6]184,931	[6]200,171	[6]208,457	[6]208,097	.....	.....	.....
Generating plants, all cent. sta	4,352	4,250	[8]3,873	[8]3,746	[7]4,339	4,292	4,438	[8]3,615
Commercial	3,232	3,190	2,863	.....	.....	.....	.....	2,734
Municipal	1,120	1,060	1,010	.....	.....	.....	.....	881
RATINGS								
Generator rating (kw.)	27,698,305	29,558,637	31,976,138	33,483,821	34,010,137	33,970,602	33,932,639	33,900,100
Prime movers (hp)	38,544,800	41,551,800	44,747,000	47,112,000	[7]47,966,962	47,940,600	47,719,400	47,630,500
Steam engines, turbines (hp.)	27,360,000	29,512,000	31,540,000	32,250,000	[7]33,553,634	33,442,600	33,161,000	32,910,000
Water wheels (hp.)	11,119,800	11,439,000	12,540,000	14,155,000	[7]13,532,027	13,601,000	13,622,400	13,723,400
Internal comb. engines (hp.)	575,000	600,000	667,000	707,000	[7]881,301	897,600	936,000	997,100
FUEL CONSUMPTION								
Coal and coke (short tons)	37,593,322	41,406,000	39,702,000	35,690,336	27,589,000	28,039,000	30,942,000	32,600,000
Oil (bbl.)	6,852,352	9,740,000	8,950,000	7,898,629	7,269,000	9,446,000	10,076,000	11,200,000
Gas (million cu. ft.)	77,054	112,442	119,457	138,483	107,138	101,000	124,648	123,000
ENERGY DISPOSITION								
Sales, ult. users (kw.-hr.)	66,988	75,294	74,906	71,902	63,764	65,754	70,782	77,355
Domestic	8,619	9,773	11,018	11,738	11,987	11,960	12,798	13,993
Small power and light	11,692	13,106	13,944	13,544	12,932	12,475	13,151	14,053
Large power and light	38,903	44,326	41,621	38,451	31,186	33,723	36,918	41,184
Municipal lighting and misc.	2,223	2,450	2,735	2,994	2,944	2,931	2,860	2,921
Railways and railroads	5,551	5,640	5,588	5,175	4,715	4,665	5,055	5,204
Company railway depts	1,330	1,279	1,184	970	843	699	652	600
Company use and losses	15,077	16,184	15,867	15,528	14,898	15,460	16,143	17,419
CUSTOMERS								
Customers, total	23,153,252	24,147,183	24,555,732	24,489,770	24,149,300	24,295,515	24,808,537	25,341,203
Domestic lighting	19,089,882	19,967,154	20,331,551	20,151,247	19,849,963	20,004,098	20,484,232	20,987,563
Small light and power	3,532,489	3,598,115	3,628,653	3,724,013	3,687,636	3,697,324	3,727,478	3,772,007
Large light and pwr. and other	530,881	581,914	595,528	614,510	611,701	594,093	596,827	581,633
People in electric lighted homes	80,300,000	82,000,000	83,400,000	82,700,000	82,500,000	82,500,000	84,500,000	86,300,000
Per cent of total population	67.5	68.0	68.2	67.4	67.0	66.7	67.1	68.0
EMPLOYEES, total	265,000	289,000	298,000	282,000	244,573	232,000	247,000	248,000

* Estimated, generally on ten months' operations.

[1] Does not include interest, taxes, depreciation or sinking fund.

[2] Includes institutional investors.

[3] Includes rights.

[6] 11,000 volts or over.

[7] Census.

[8] Listed in Central Station Directory.

Bonds and Stocks Show Large Gains

Defaults of 1935

Holding Companies

		Defaulted
$9,826,000	Standard G. & E. cons. 6s, '35*†...	October
7,603,400	Amer. States Pub. Ser. 1st 5½s, A..	May
1,896,000	N. American Gas & Elec. deb. 6s...	July
$19,325,400		

Operating Companies

$6,896,900	Northwestern Elec. 1st 6s, '35†....	May
6,351,000	Missouri Public Service 1st 5s.....	August
$13,247,900		
$32,573,300		

*Interest resumed after dismissal of enjoining litigation.
†Plans for extension beyond 1935 maturity pending.

Southern California Edison Company, which sold three issues of bonds and one of debentures totaling $165,500,000, as follows: $73,000,000 refunding mortgage 3¾s, sold in April at a 3.84 yield; $35,000,000 series B refunding mortgage 3¾s, sold in July to yield 3.85; $30,000,000 of first and refunding 4s, sold in September on a 3.875 basis, and $27,500,000 of one to ten-year 2½, 3½ and 3¾ per cent debentures, sold in September to yield 0.875 to 3.75 per cent.

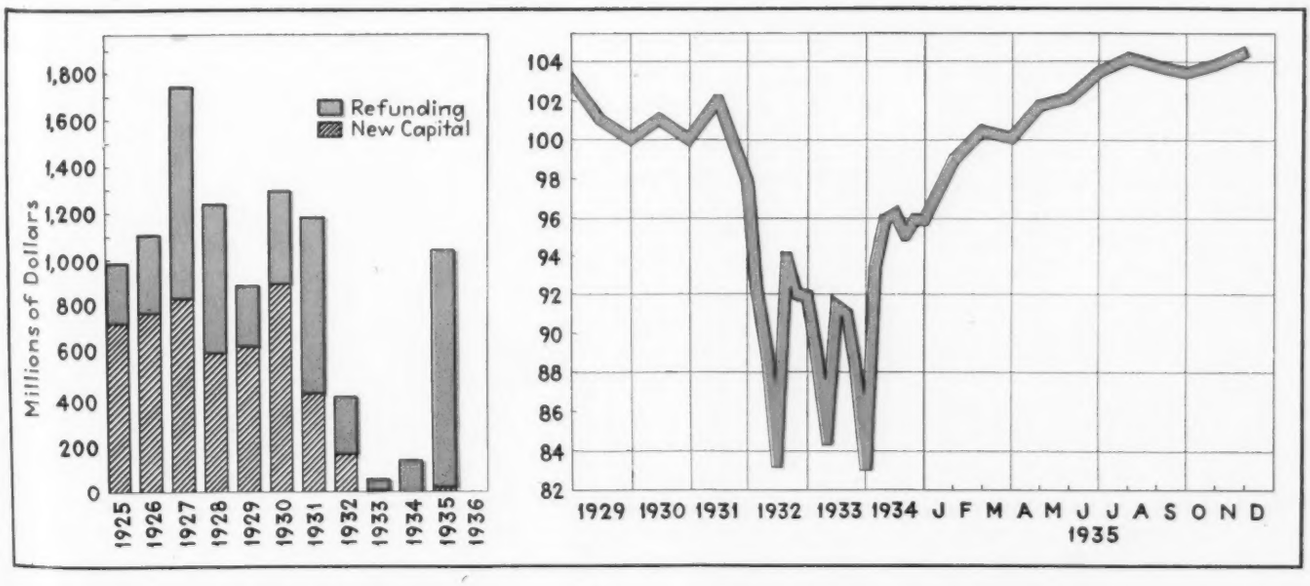
Another California company, Pacific Gas & Electric, held second place with its $95,000,000 total, made up of three issues of its first and refunding series G 4s, which, in blocks of $45,000,000, $30,000,000 and $20,000,000 in March, June and September, respectively, were sold to yield variously from 3.77 to 4 per cent. Many other large issues give similar evidence of the market's receptiveness, with the following more or less typical: Duquesne Light first 3½s, $70,000,000 to yield 3.42; Edison Electric Illuminating of Boston first mortgage series A 3½s, $53,000,000, yield 3.30; Public Service Electric & Gas first and refunding 3½s (placed with institutional buyers), $50,000,000, yield 3.50; Detroit Edison general and refunding series F 4s, $49,000,000, yield 3.80; Ohio Edison first and consolidating 4s, $43,963,500, yield, 3.91; Cleveland Electric Illuminating general mortgage 3¾s, $40,000,000, yield 3.60, and Los Angeles Gas & Electric first and general 4s, $40,000,000, yield 3.89.

The manner in which such large issues were absorbed was the topic of no little comment in financial circles, but it was pointed out at the same time that slightly less than $26,500,000 of the huge total represented new capital issues, a fact conspicuous in other industrial and railway as well as utility offerings.

Receiverships of 1935*

American States Public Service Company
Arkansas-Missouri Power Company
Galveston-Houston Electric Company
Kentucky Electric Power Corporation
Lamoka Power Corporation
Missouri Gas & Electric Service Company
Missouri Public Service Company
Northwestern Electric Company

*Includes companies for which trustees have been appointed under the Corporate Bankruptcy Act or for which receivers have been appointed in equity proceedings.



Utility Issues $1,000,000,000 **Bonds Increase 27 per Cent**

Utilities Could Bring Recovery

Utilities to

Capital Budget for 1936 of $371,557,774

Maintenance Expenditures for 1936 $100,947,105

Capital Expenditures in 1935 $237,463,487

Maintenance in 1935 of $92,886,745

IF THE utilities were free from governmental competition and persecution they would spend enormous sums for expansion and development. This is well indicated by the fact that dire necessity forces them to budget a capital expenditure of $371,557,774 in 1936, as against a capital expenditure of $237,463,487 in 1935—a 56 per cent increase.

A large part of this increase is accounted for by two factors—one the necessity to add generating capacity and the other the large program in rural and distribution to care for the loads sold by the utilities. Especially significant is the large increase in commitments for generating capacity to care for the loads. Actual commitments are slow to be made, but the best estimates give new capacity requirements of about 1,000,000 kw. in 1936, at least as regards commitments. This necessity calls for enormous sums, and the governmental and political handicaps confronting the industry give cause for serious concern in that "postponement" is now the practice instead of the usual "building ahead of the load." If free from these handicaps undoubtedly the industry would order at least 2,000,000 kw. in added capacity in 1936 and thus give a major stimulus to the heavy industries and their employees.

Actual additions to utility generating capacity during 1935 is recorded as 386,090 kw. which, at $100 per kilowatt, gives a capital expenditure of $38,609,000. Recorded projects for 1936 to date amount to 768,900 kw., which will involve an expenditure of $76,890,000 on the same basis. But late reports of as yet not finally approved purchases of generating equipment promise to expand this sum, as is indicated in the total utility budget for generating capacity of $118,000,000.

In addition to the utility expenditure it should be pointed out that the federal power program has already allocated $591,000,000 in an ultimate total of nearly $2,000,000,000 contemplated. During 1936 it is estimated that at least $100,000,000 of this money will be spent for generating capacity for these projects.

As is usual, the major capital expenditure will be in distribution. To improve service and to carry the new loads an expenditure of $209,127,485 will be made. This shows that further rate reductions in the face of rising costs, taxes and capital expenditures must be confined largely to the development of inducement rates for greater use. A goodly part of this expenditure will go for rural lines and extensions to unserved territory.

It is shown in an accompanying article that 20,062 miles of rural line were built by the utilities in 1935. This at $1,200 a mile gives a total expenditure of $24,074,400. This may well be contrasted to the 2,634 miles of line approved by R.E.A. with a total expenditure of $2,071,062. It is doubtful if any appreciable part of this money was spent in 1935 and it properly belongs to 1936 budgets.

Utilities contemplate the building of 31,664 miles of rural line in 1936, which will mean an expenditure of $37,996,000. These data show the relative importance of R.E.A. and utility expenditures for rural service as well as the corresponding effects on national recovery. The distribution budget contains miscellaneous expenditures, which consist of offices, shops and other service buildings. A great part of the distribution expenditure is for extensions and for more transformers, regulators and meters. Heavy-duty appliances are forcing a revamping of distribution on many properties and it is expected that this program will be increased appreciably in 1936.

Utility Expenditures and Budgets

1935 Capital Expenditures	
Generating capacity	$43,220,816
Transmission	14,114,289
Distribution and substations	161,683,786
Miscellaneous	18,444,596
Total	$237,463,487
1935 Maintenance Expenditures	92,886,745
1936 Capital Budget	
Generating capacity	118,460,653
Transmission	22,919,985
Distribution and substations	209,127,485
Miscellaneous	21,049,651
Total	$371,557,774
1936 Maintenance Budget	$100,947,105

Total Capital Expenditures of Utilities

(Thousands of Dollars)

Year	Total	Generation	Transmission Distribution
1926	841,344	400,107	441,237
1927	760,353	234,883	525,470
1928	786,978	284,874	453,796
1929	866,344	281,460	528,896
1930	960,889	325,296	569,655
1931	633,415	162,843	428,797
1932	260,000	46,000	199,000
1933	180,000	30,000	140,000
1934	170,000	20,000	140,000
1935	237,463	43,221	175,798
1936	371,558	118,461	232,047

Spend $472,504,879

Despite endeavors to lower distribution costs, greater use and better service are increasing these costs and there appears to be little possibility to make major economies in distribution under the present load-building program.

Transmission line building by utilities is confined largely to rebuilding old lines, adding new links and the construction of lower voltage lines. An expenditure of $22,919,985 for transmission in 1936 is a good increase over the $14,114,289 spent in 1935 and shows a steady growth to meet the new conditions.

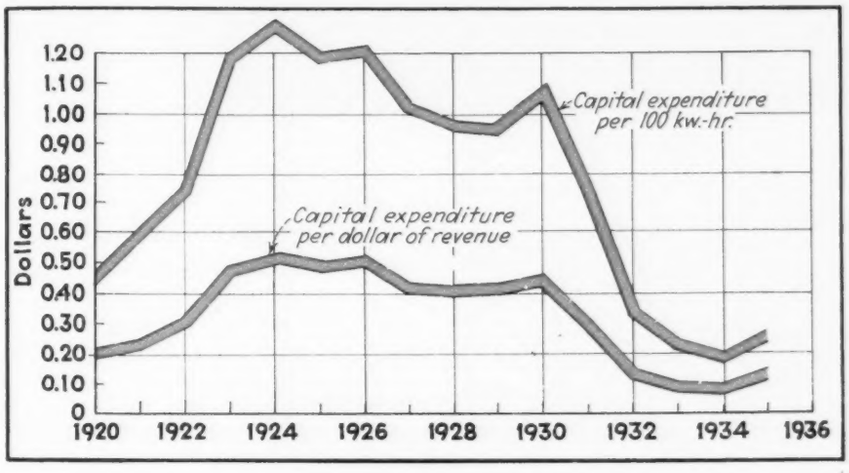
Several large high-voltage lines are in contemplation for 1936, chiefly in connection with federal projects. The other large transmission expenditures will be in rebuilding and strengthening old lines and the extension of wood-pole lines into outlying territory. It should be noted that large sums will be spent in adding new breakers, remodeling old breakers and adding relays and protective devices to improve service on transmission systems. Several transmission substations and switching stations are included in this item of the budget.

Underground transmission has been quiet for several years, but indications point to an appreciable increase in cable installations in 1936. Added loads and the need for extensions make more cables necessary, and there is a return to the trend to install networks and to put systems underground. It is also probable that new developments, such as the "Oilostatic" cable system, will give an impetus to underground transmission. Cables are also coming into greater use in overhead transmission substations and switching stations.

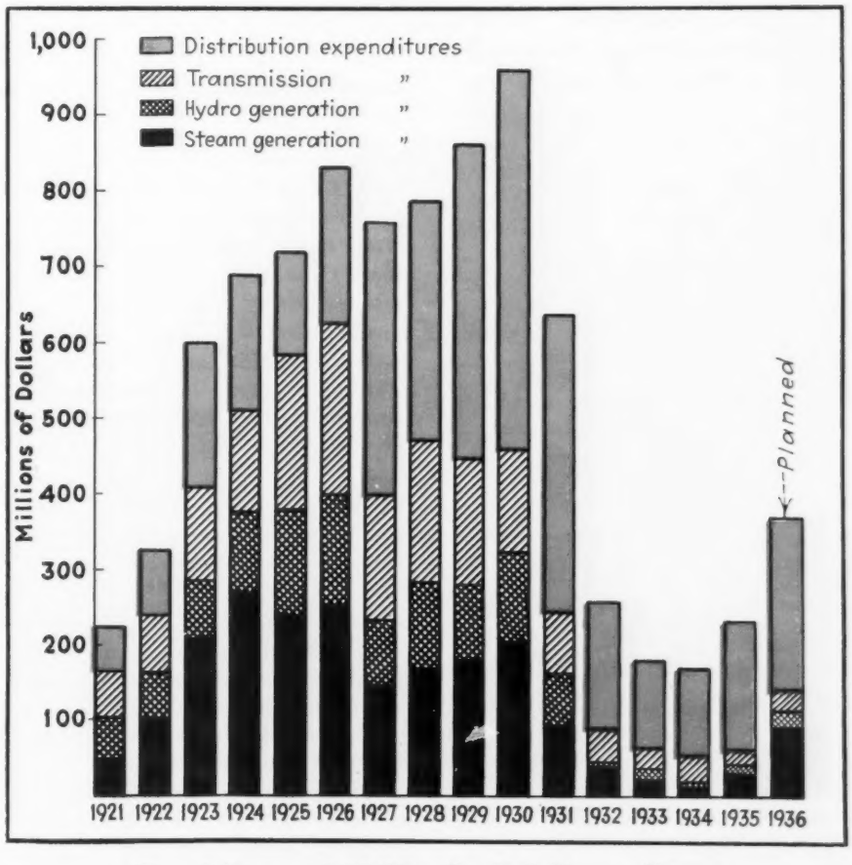
In addition to these capital expenditures it may be noted that maintenance expenditures for 1936 aggregate $100,947,105, as against $92,886,745 in 1935. This has become an appreciable item of cost because of "wear-out" effects now coming into play and because improved service is required for the new loads served by utilities.

This budget and expenditures estimate covers all utilities except the governmental projects and is based upon confidential reports from utility properties plus estimates arrived at by using capacity, customer and area data.

Undoubtedly if the private utilities were free from political harassment and the pernicious new utility legislation they would probably double the contemplated total expenditure of $472,504,879 in 1936 and give the greatest stimulus to recovery and employment of any single industry in this country. It speaks well for their courage that they undertake even this order of expenditure under present threatening conditions. It will in itself give a great stimulus to national recovery.



Unit Expenditures Still Below Normal



Breakdown of Utility Capital Expenditures

Need Station Capacity for New Loads

New Plants

Few New Plants Were Put Into Operation in 1935, but Additions Were Fairly Numerous — New Capacity Was 386,000 Kw., 345,000 Kw. Steam

NEW capacity scheduled to be installed during 1936 will exceed three-fourths of a million kilowatts. Known additions here listed total 768,890 kw., with additional orders in abeyance pending clarification of the governmental obstacles that now hamper the making of investments. If and when these obstacles are removed the electric power industry will be ready to proceed with construction programs that will increase employment not only in this industry but in the tributary heavy industries, where it is needed. Additional orders for steam equipment exceeding 100,000 kw. are understood to have been made, but these were not reported by power companies, presumably being intended for later installations.

This scheduled construction is larger than in any of the past three years. At the head, in steam, are additions of 60,000 kw. by the Detroit Edison Company, 50,000 kw. by the New York Edison and 35,000 kw. by the Ohio Public Service Company. Two municipalities—Columbus, Ohio, and Springfield, Ill.—report additions of 10,000 kw. each.

In water power the outstanding installation will be the 330,000 kw.—consisting of four units rated at 82,500 kva. at 100 per cent power factor—to go into operation for the city of Los Angeles at Boulder Dam. The Diablo plant of the city of Seattle is to come in with 135,000 kw. and Pasadena reports 11,880 kw. at Boulder Dam.

Conspicuous additions in steam in 1935 were the 165,000 kw. in Rich-

Summary of Additions

New Capacity, 1935

	Private	Municipal	Total
Steam	316,200	29,125	345,325
Water power	38,950	.....	38,950
Internal comb'n.	1,815	.....	1,815
Total	356,965	29,125	386,090

Scheduled for 1936

Steam	247,500	23,000	270,500
Water power	19,130	476,880	496,010
Internal comb'n.	2,380	.....	2,380
Total	269,010	499,880	768,890

Capacity Retired or to Be Retired

Private Utilities

Steam Company	1935 Kw.	1936 Kw.
Abington Elec.	750	.....
Detroit Edison	20,000	.....
Edison Elec. Ill., Boston	8,000	.....
Gen'l Pub. Util., Inc. (Deadwood, S. D.)	.....	1,500
Iowa Pub. Serv.	150	.....
Jersey Central P. & L.	1,500	.....
Key West Electric	230	.....
Milwaukee E. R. & L.	.....	625
New York Edison	.....	38,000
Niagara Hudson Power	1,500	.....
Pennsylvania Electric	1,500	.....
Public Serv. Co. of Okla.	.....	1,000
Rockport Water Works	.....	125
Savannah Elec. & Pwr.	.....	3,000
So. California Edison	25,000	.....
Southern Indiana G. & E.	.....	2,500
Water Power		
Georgia Power	.....	312
Mountain States Pwr.	.....	300
Puget Sound P. & L.	400	.....
Southern Utah Power	.....	600
Internal Combustion		
Gulf States Utilities	.....	200

Municipal Plants

Steam		
Chanute, Kan.	500	.....
Fairmont, Minn.	300	.....
Hannibal, Mo.	1,500	.....
Independence, Mo.	1,000	.....
Manitowoc, Wisc.	2,750	.....
Shelby, Ohio	350	.....

Power Plant Capacity Added During 1935

Private Utilities

Steam Company	Added to Existing Plants, Kw.	New Plants Kw.
Abington Electric	3,000	.....
Detroit Edison	30,000	.....
General Pub. Util. Inc. (Deadwood, N.D.)	3,000	.....
Iowa Pub. Serv.	750	.....
Laclede Pwr. & Lt.	.....	2,700
Milwaukee E. R. & Lt.	.....	80,000
New York Edison	10,000	.....
Philadelphia Electric	165,000	.....
Rochester G. & E.	6,000	.....
Rockport (Ind.) Waterworks	750	.....
Savannah Elec. & Pwr.	7,500	.....
Virginia Public Serv.	7,500	.....
Water Power		
Appalachian Elec.	.....	27,000
Idaho Power	.....	9,375
Newport (Vt.) El. Corp.	200	.....
Potomac Light & Pwr.	.....	50
Southern Utah Power	1,000	.....
Virginia Elec. & Pwr.	1,225	.....
Internal Combustion		
Central Pwr. & Lt.	840	.....
Florida Pwr. & Lt.	200	25
Key West Electric	400	.....
Minnesota Pwr. & Lt.	.....	120
Mountain States Pwr.	230	.....

Municipal Plants

Steam		
Chanute, Kan.	2,500	.....
Fairmont, Minn.	1,875	.....
Ft. Collins, Colo.	.....	3,000
Hannibal, Mo.	7,500	.....
Fulton, Mo.	1,250	.....
Independence, Mo.	4,000	.....
Manitowoc, Wisc.	5,000	.....
Shelby, Ohio	1,500	.....
Troy, Ohio	2,500	.....

Will Total 769,000 Kw.

mond station of the Philadelphia Electric Company, the new 80,000-kw. Port Washington plant of the Milwaukee Electric Railway & Light Company, the 30,000-kw. unit in Detroit replacing 20,000 kw. retired, and the superposition of a 6,000-kw. high-pressure unit, with added boiler plant at 700 lb. and 750 deg. by the Rochester Gas & Electric Company to be duplicated in 1936.

The accompanying chart shows that the load conditions prevailing in the winter of 1929-1930 will be exceeded next winter, taking into account the present rate of load growth and the increased capacity.

At the present rate of growth the hours of demand in the winter of 1936 will be greater than in the winter of 1929-1930.

Capacity Scheduled for Completion in 1936

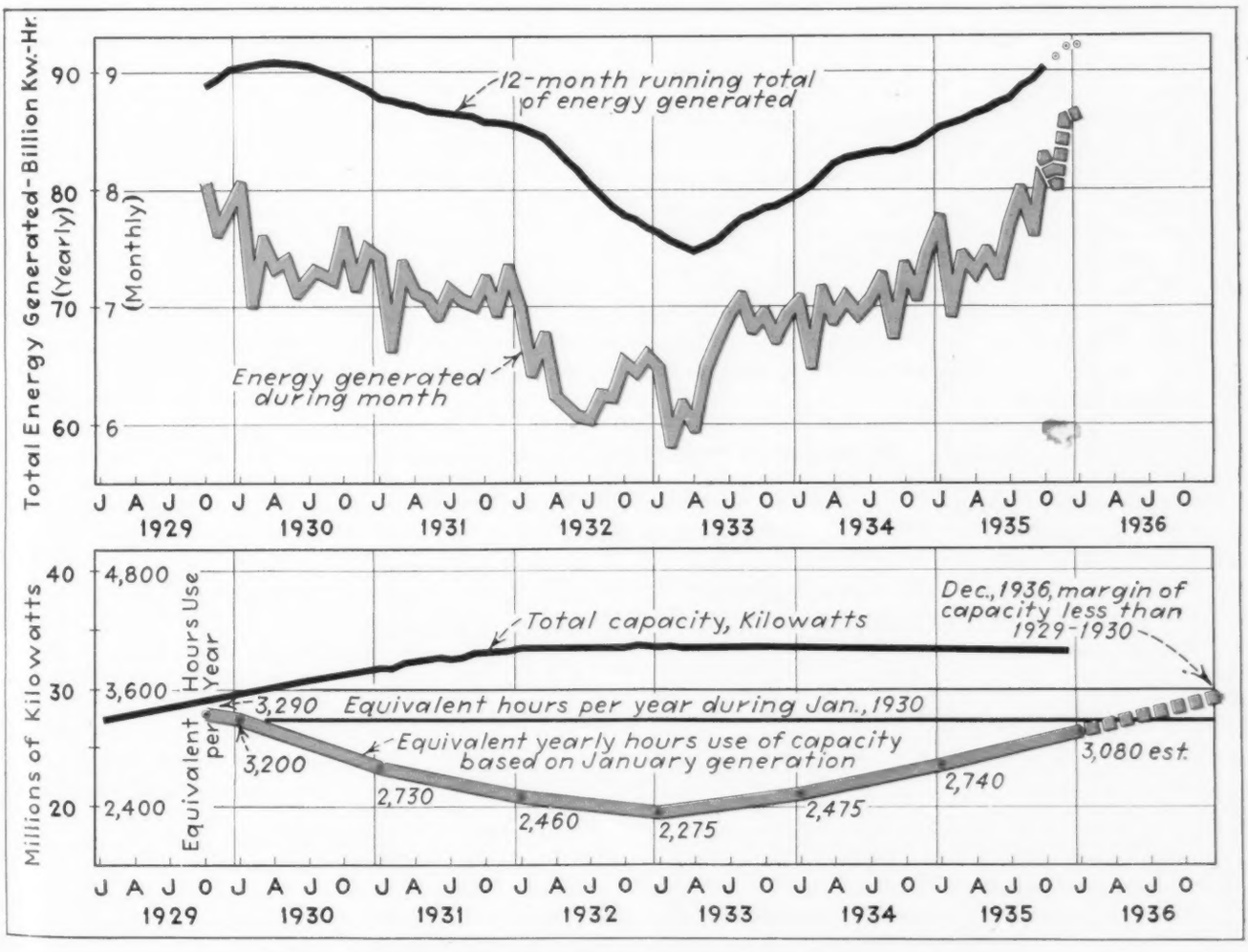
Private Utilities

Steam Company	Added to Existing Plants, Kw.	New Plants Kw.
Appalachian Elec. ('37)	40,000	.....
Arkansas-Missouri Pwr.	.....	10,000
Cheyenne L. & P.	.....	1,500
Detroit Edison	60,000	.....
Iowa El. Lt. & Pwr.	5,000	.....
Mt. Carmel P. U. & Serv.	1,500	.....
New York Edison	50,000	.....
Ohio Pub. Service	35,000	.....
Potomac Edison	10,000	.....
Rochester G. & Elec.	6,000	.....
Sheridan County (Wyo.)	2,500	.....
South Carolina Util.	1,000	.....
Southern Indiana G. & E	12,500	.....
Virginia Elec. & Pwr.	12,500	.....
Water Power		
Connecticut Light & P.	8,200	.....
Interstate Pwr.	200	.....
Newport (Vt.) El. Corp.	.....	1,000
Mountain States Pwr.	750	.....

Water Company	Added to Existing Plants, Kw.	New Plants Kw.
Public Electric Light	.....	2,000
Public Service, Colo.	.....	6,000
Public Utilities Consol.	.....	1,500
Internal Combustion		
Central Pwr. & Light	50	.....
Interstate Pwr.	1,000	.....
Iowa Public Serv.	.....	730
Southwestern Pub. Serv.	600	.....

Municipal Plants

Steam		
Columbus, Ohio	10,000	.....
Dover, Ohio	2,000	.....
Independence, Mo.	3,000	.....
Springfield, Ill.	10,000	.....
Water Power		
Los Angeles (Boulder)	.....	330,000
Pasadena, Calif. (B'ldr)	.....	11,880
Seattle	.....	135,000


Total Energy Generated-Billion Kw.-Hr.
(Yearly)
(Monthly)
12-month running total of energy generated
Energy generated during month
J A J O J A J O J A J O J A J O J A J O J A J O J A J O J A J O
1929 1930 1931 1932 1933 1934 1935 1936
Millions of Kilowatts
Hours Use Year
Equivalent per
Total capacity, Kilowatts
Dec., 1936, margin of capacity less than 1929-1930
3,290 Equivalent hours per year during Jan., 1930
Equivalent yearly hours use of capacity based on January generation
3,200
2,730
2,460
2,275
2,475
2,740
3,080 est.

Use of Generating Capacity Approaches Danger Line

Rural Service to Expand 50 per Cent

New Rural

Projected Outlay $50,000,000

167,000 New Rural Customers

This Year Will Add 93,000 Farms

Industry Moving Without Federal Loans

RURAL line extensions projected for 1936 represent an increase in activity of 50 per cent over what was done during the year just past. Data from 176 companies that already had 1,156,286 customers on 151,030 miles of rural lines show that 15,832 miles of rural lines will be built by them in the year just begun. Since they serve almost exactly half the electrified farms (400,000 out of 793,000) their reports can be doubled to derive a national index.

An outlay of more than $38,000,000 by private utilities for lines before taking into account the supplementary expenditure of $9,400,000 for services, meters, etc., will probably be incurred for new patrons in rural areas in 1936. Not one of these 176 companies had recourse to governmental funds. The Rural Electrification Administration has, however, lent $107,800 to two utilities which are not included in the data herewith. Only three (small) companies said positively that they planned to use the governmental assistance. Five said "possibly" or "conditionally." Twenty-five said "undecided" and the remaining 143 said "no" without qualification. As to the E.H.F.A. aid in financing customer purchases of appliances and wiring, ten utilities indicated that they were expecting to take advantage of its facilities, eighteen said "possibly" or "conditionally" and twenty said "undecided." All of the rest said "no" without qualification.

Thus, under the impetus of political or popular demand for fuller coverage of the country, the utilities will in two years have increased by one-sixth the number of miles of line in rural areas. The industry's contribution to 1935 work activity, adding at the same time to desirable electrification of farms and small villages, can be set at no less than $24,000,000 and another $8,000,000 for meters and service connections to customers.

300,000 new customers

Meanwhile 300,000 new customers will have been added during 1935-36 to the previous rolls in rural districts (most companies follow Census practice in rating as rural all communities under 2,500). Some approach to saturation or limiting densities is indicated by the fact that 47½ per cent of the two-year customer growth in rural areas has already taken place in 1935, whereas only 40 per cent of the line building was effected in the first of the two years. A less reliable index of the decreasing density of customers on recent and prospective rural lines is the set of customer-per-mile figures in the table. They are called less reliable because no effort was made in the queries to confine the answers to customers attached solely by the new lines. A sizable fraction of the 71,501 reported (143,000 estimated for the whole country) added in 1935 was served from existing lines. The same is true of the reported expected (78,701) and national estimated figures (157,400) for 1936.

Nevertheless there is consistency in the relative customer-per-mile data, which show a steady dip in customer density. If the data could be confined solely to the new construction, they would undoubtedly confirm the general comment that expansion is already down to the practicable economic limit of three customers per mile.

Farms served increased by more than 10 per cent in 1935 and the prospective increase is another 11.5 per cent added to the 1934 figures during 1936. The 176 companies embraced in the tabulation alone rendered service to 42,000 new farms in 1935 and the new ones in 1936 are expected to total to 46,000 more. National totals are estimated at double these figures.

Up to mid-December the Rural Electrification Administration had lent $2,971,062 to cover the serving of

Rural Electrification Projects Approved by R.E.A.

County and State	Miles of Line	Farms Served	Amount
Boone, Ind.	587	2,200	$567,926
Rhea, Tenn.	38.9	215	38,058
Scotts Bluff and Sioux, Neb.	226.5	839	310,000
Scotts Bluff, Neb.	47	143	65,000
Miami, Ohio	193	690	254,000
Bell and Williamson, Texas	39	110	33,000
Dallas, Iowa	3	50	6,100
22 in South Carolina	511	2,128	542,328
Shelby, Ohio	270	1,005	350,000
Monroe, Miss.	55.3	361	81,000
Meigs, Tenn.	78.6	545	92,200
Gage County, Neb.	450	1,117	440,000
Bonner and Boundary, Idaho	75	320	89,750
Fleming, Lee and Owsley, Ky.	38.7	360	71,700
Oklahoma and Canadian, Okla.	30	155	30,000
Totals	2,634	10,238	$2,971,062

Line Mileage 35,000 in 1936

10,238 new rural customers by 2,634 miles of line. This is set down here in the "planned for 1936" category and accounts for the 35,000 miles, $50,000,000 and 167,000 new rural customers that are cited in the title of the page.

Utilities lead in growth of lines and service

It is very evident that the long-continued policy of the utilities to serve the farms of this country is being applied with increasing success and that the federal program is lame and halting by comparison. There is a reason. Rural service is a very difficult business to develop and to serve. It is a local business that takes incessant attention and it cannot be handled or operated from Washington. Farmers are reluctant to spend money and eager to accept money. They are ultra-conservative and dislike to change their habits. They do not team well together, so that is is difficult to get a group of farmers to act in unison.

Rural service does not pay costs

We doubt very much if a fraction of a per cent of farm lines do or will pay their way. This is a subsidy service today and promises to continue in this class for many years. The only basis upon which it can be supported is the fact that an entire area or region supports the business. Any approach to farm service from a true cost point of view will result in failure. Despite these handicaps the utilities are building the lines and giving the service at a rapid rate and will continue to do so. They lean over backward in the hope that the business will become profitable.

Nor should it be forgotten that manufacturers of rural line equipment and of farm appliances have put their best efforts forward to reduce costs. They have improved old devices and made new ones. They have tried many new designs. They have co-operated with engineers in simplified construction and equipment. But the resultant economy has not been great. Rural service must be as good as if not better than city service. Each reduction in first cost is apt to result in increased maintenance cost. There appears to be little in sight to change the economic status of rural service.

A much exaggerated idea of farm electrification prevails both as to its practical aspects and its business possibilities for the electrical industry. In reality it is a relatively unimportant and very difficult business undertaking. This will be known by all in time. In the meanwhile the utilities are doing their utmost to do this work and are receiving the wholehearted support of the other branches of the industry.

Line Building Accelerated in Rural Districts

Data from half the industry shows 17 per cent expansion in 1935-36, with major portion in the coming year

Company	Miles of Rural Line			Rural Customers			Farms Served			Customers Per Mile		
	End of 1934	Added 1935	Planned 1936	End of 1934	Added 1935	Planned 1936	End of 1934	Added 1935	Planned 1936	End of 1934	Added 1935	Planned 1936
Arkansas P. & L.	600	350	200	2,400	1,400	1,000	2,000	1,200	700	3.33	4.00	5.00
Ohio Pub. Serv. Co.	937	126	186	3,914	615	495	2,860	495	615	4.17	4.88	2.66
Duke Power Co.	2,907	519	550	22,014	3,772	3,500	7,943	1,470	1,500	7.61	7.28	6.36
Conn. L. & P. Co.	2,500	120	250	20,000	380	900	6,538	175	400	8.00	3.17	3.60
Niagara-Hudson Corp.	9,496	344	1,600	136,277	1,485	6,115	27,814	948	3,835	.....	4.32	3.82
Washington Water P. Co.	1,500	150	250	8,000	400	500	5,075	350	400	5.33	3.33	2.00
Detroit Edison Co.	3,212	560	350	.....	.....	.....	14,167	2,520	1,575	.....	.....	.....
Metropolitan Edison Co.	1,531	140	200	17,690	694	1,000	4,330	283	400	11.58	4.89	5.00
Alabama Power Co.	2,118	223	492	8,441	983	2,289	10,363	590	1,375	4.00	4.41	4.66
Nebraska Power Co.	695	150	300	1,297	360	600	1,245	345	575	1.87	2.40	2.00
Ill. No. Utilities Co.	570	135	200	1,879	400	600	1,615	375	560	3.29	3.00	3.00
Virginia Elec. P. Co.	1,560	100	150	9,100	700	700	2,100	60	100	5.83	7.00	4.66
West Penn P. Co.	2,100	260	239	58,269	2,250	1,973	3,032	470	415	27.80	8.55	8.27
Pub. Serv. Co. of Ind.	3,650	230	400	12,233	860	1,500	8,509	615	1,100	3.35	3.74	3.75
Central Hudson G. & E. Corp.	1,830	175	425	30,398	300	1,700	3,900	590	1,360	15.62	4.57	4.00
Pacific Gas & Elec. Co.	14,702	400	300	133,925	6,500	6,000	35,000	400	500	9.10	16.25	20.00
Dayton P. & L. Co.	1,316	175	250	5,185	900	1,200	3,629	665	840	3.94	5.14	4.80
Idaho Power Co.	2,193	250	150	15,600	1,300	1,100	9,278	925	800	7.11	5.20	7.33
Pub. Serv. Co. of Col.	1,530	150	20	7,200	175	200	2,740	160	150	4.70	1.16	10.00
Penn. Power & Lt. Co.	3,775	600	700	52,395	2,520	2,400	10,396	1,680	2,000	13.85	4.20	3.43
N. Y. State G. & E. Corp.	4,600	200	700	23,000	1,000	3,000	5,000	700	2,100	5.00	5.00	4.29
Consumers Power Co.	.....	483	950	.....	4,050	6,000	.....	3,669	5,600	.....	8.31	6.32
Central Ill. P. & L. Co.	491	43	375	1,597	285	1,320	1,500	275	1,300	3.25	6.65	3.51
Tenn. Elec. Power Co.	1,250	85	281	10,000	954	2,136	5,000	404	1,177	8.00	11.20	7.61
Georgia Power Co.	1,853	160	400	21,870	1,767	2,880	1,050	175	280	11.80	11.05	7.20
Totals (25 Cos.)	66,916	6,128	9,918	602,684	34,550	49,108	175,084	19,539	29,657	9.00	5.62	4.94
151 Other Companies	84,115	4,013	5,914	553,602	36,951	29,593	225,252	22,053	16,690	6.57	9.22	5.00
Totals for 176 Companies	151,031	10,141	15,832	1,156,286	71,501	78,701	400,336	41,592	46,347	7.66	7.05	4.97
Est'd National Total	302,062	20,282	31,664	2,312,572	143,002	157,402	800,672	83,184	92,694	7.66	7.05	4.97

Power Projects Now Aggregate $1,000,000,000

U.S. Allocates

Four-fifths to Federal Projects

Districts Get Over $100,000,000

Many Competitive Municipals Aided

South and West Get Most of It

TOWARD the completion of power projects which will ultimately cost around $2,000,000,000 the federal government has now appropriated nearly $600,000,000. Time alone will tell how much of it is justifiable or will repay the indebtedness. But it is inescapable that for the moment it has given a welcomed spurt to construction and to production in electrical manufactures. Without this artificial stimulus the heavy machinery and conductor branches of the industry would have been at excruciatingly low ebb. On the contrary, the persistent acceptance of the electrical era by the nation would have led to a comparably great natural outlay by the utilities themselves had they not been browbeaten by an utterly unparalleled political assault. That it is undeniably political is shown by just two outstanding facts of statistics:

First, more than half of the $29,316,297 which has gone to municipalities in the form of grants (45 per cent) and loans (55 per cent) is for enterprises that are competitive with established privately owned utilities.

Second, the political objective is demonstrated by the fact that more than 92 per cent of the money allocated has been to states that lie south of the Ohio and west of the Mississippi.

Those states embrace

National and Local Projects Involve Nearly $600,000,000

Category	Appropriations, Gifts and Loans Already Made	Present Estimate of Final Outlay
Federal projects	$403,860,000	$816,302,000
State and district projects	54,658,754	116,600,754
Municipal projects	27,316,297	36,000,000
Rural electrification	100,000,000	100,000,000
Elec. Home and Farm Auth.	1,000,000	1,000,000
National Power Survey	400,000	400,000
Electric Rate Survey	425,000	425,000
National Power Policy Comm.	100,000	100,000
River utilization surveys	1,500,000	1,500,000
Totals	$589,260,051	$1,072,327,754

Nine Federal Projects Accorded $400,000,000

Electrical Project	Total Est. Cost	Appropriated
Tennessee Valley Authority		
Wilson Dam (now valued)	$20,000,000	
Norris Dam	36,000,000	
Joe Wheeler Dam	27,000,000	
Pickwick Dam	24,000,000	
Guntersville Dam	17,000,000	
Chickamauga	15,000,000	
Hiwassee Dam	12,000,000	
Plant and equipment	14,000,000	
Transm. and distribution	100,000,000	
	$265,000,000	$111,000,000
Central Valley (Col.)	170,000,000	15,000,000
Boulder Canyon	108,660,000	108,660,000
Fort Peck	86,000,000	71,000,000
Grand Coulee*	60,000,000	35,000,000
Bonneville	55,000,000	32,200,000
Passamaquoddy	36,000,000	10,000,000
Casper-Alcova	22,700,000	20,000,000
Bluestone Res. (W. Va.)	12,942,000	1,000,000
	$816,302,000	$403,860,000

*Preliminary development only, ultimate in excess of $300,000,000

Municipal Electric Projects Draw Federal Subsidy

State	Towns	Population	Loans and Grants	State	Towns	Population	Loans and Grants
Ala.	8	46,971	$1,451,453	Neb.	5	18,960	$119,355
Ark.	2	8,539	215,000	Nev.	1	1,989	35,000
Cal.	5	67,636	979,869	N. J.	1	7,556	184,500
Col.	4	20,210	980,235	N. Y.	6	85,195	1,267,182
Del.	1	3,719	90,000	N. C.	2	15,507	60,000
Fla.	6	50,415	1,075,710	N. D.	3	26,570	1,256,863
Ga.	6	88,446	364,900	Ohio	8	337,801	1,774,772
Idaho	2	9,128	669,636	Okla.	8	35,512	880,700
Ill.	10	134,380	1,827,263	Pa.	4	86,153	549,554
Ind.	3	119,859	114,270	S. D.	1	1,460	23,250
Iowa	8	26,158	776,504	Tenn.	5	129,430	3,324,000
Kan.	14	102,533	605,979	Tex.	8	47,110	1,380,136
Ky.	1	10,350	328,000	Utah	3	8,706	256,636
La.	1	23,025	250,000	Vt.	3	28,875	193,785
Mass.	1	21,748	16,100	Va.	3	27,050	2,925,609
Mich.	7	25,856	1,442,524	Wash.	2	912	203,400
Minn.	12	49,913	1,527,464	W. Va.	1	2,814	32,727
Miss.	3	11,426	215,271	Wis.	3	61,398	266,650
Mo.	11	69,799	1,652,000				
				U. S.	172	1,813,109	29,316,297

$589,000,000 for Power

the pivotal states and those deserving rewards for political allegiance. They are represented at Washington by the principal baiters of private enterprise as exemplified by the electric utilities. At least a tenth of the enormously increased national debt has been incurred in an effort to punish three million investors for putting their savings in an indispensable industry that pays 6 per cent of the taxes that support the power subsidies. Whether all the money allocated will be spent in large measure depends upon the outcome of the litigation now under way and in contemplation. Utilities, investors and local groups are vigorously defending the rights of private enterprise.

Federal Grants 44% Outright Gifts

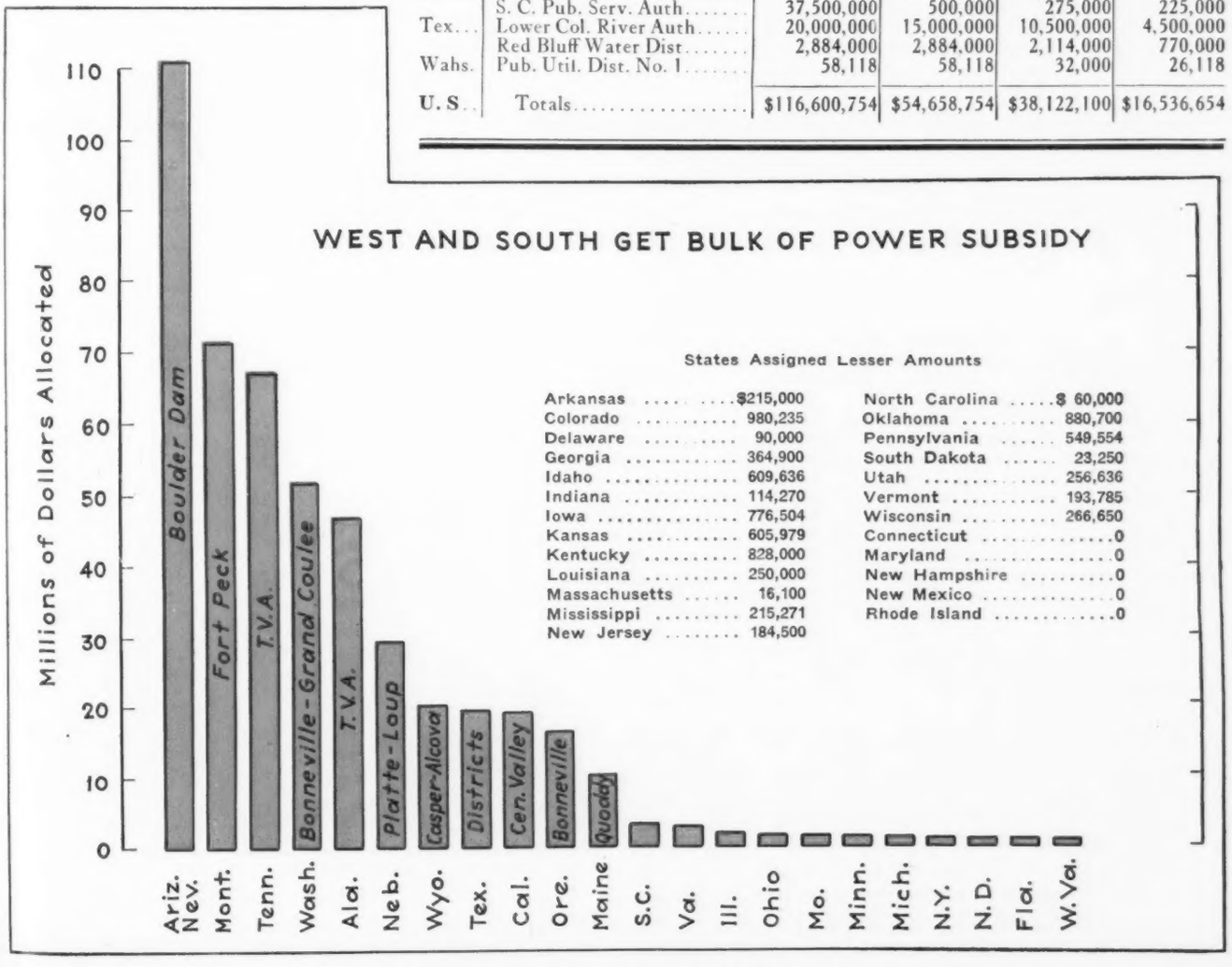
	Circumstances: Competitive	Circumstances: Non-Competitive	Total
No of Towns	82	90	172
Loans.	$11,997,516	$4,479,500	$16,477,016
Grants	7,444,031	5,395,250	12,839,281

Status of Injunctions

Sought in competitive situations	26
Cases pending or preliminary	11
Appeals pending	11
Suit withdrawn	1
Dismissed or dissolved	2
Sustained	1

State and District Projects Have Taken over $50,000,000

State	Project	Total Cost, Est.	Advanced by Government: Total	As Loans	As Gifts
Ariz.	Navajo County	$148,000	$148,000	$106,600	$41,400
Cal...	Metro. Water District	13,000,000	2,000,000	1,400,000	600,000
	Hetch Hetchy (San Fran.)	.....	1,058,000	.....	1,058,000
Neb...	Cen. Neb. Pub. Pwr. & Irr. Dist	20,000,000	10,000,000	5,500,000	4,500,000
	Loup R. Pub. Pwr. Dist	8,700,000	8,700,000	7,525,000	1,175,000
	Platte V. Pwr. & Irr. Dist	9,700,000	9,700,000	7,250,000	2,450,000
	S. E. Neb. Pub. Pwr. Dist	575,000	575,000	405,500	169,500
Nev...	Lincoln City Pwr. Dist	1,120,000	1,120,000	784,000	336,000
Ore...	Enterprise Irr. Dist	63,636	63,636	35,000	28,636
S. C...	Greenwood County	2,852,000	2,852,000	2,195,000	657,000
	S. C. Pub. Serv. Auth	37,500,000	500,000	275,000	225,000
Tex...	Lower Col. River Auth	20,000,000	15,000,000	10,500,000	4,500,000
	Red Bluff Water Dist	2,884,000	2,884,000	2,114,000	770,000
Wahs.	Pub. Util. Dist. No. 1	58,118	58,118	32,000	26,118
U. S..	Totals	$116,600,754	$54,658,754	$38,122,100	$16,536,654



Company Balance Sheets Encouraging

Utility Ratios

Net Is One-Sixth of Gross

Depreciation Reserves 9%

Dollar of Gross for Six

of Book Value

Surpluses on Par With Gross

NOT only have electric utilities in general preserved their solvent status remarkably well but analysis of 233 primarily electric companies shows that they have succeeded, in the face of mounting taxes and expenses, in holding to consistent financial ratios which serve as indexes of well-being and foresighted management. These remarks apply generally to properties from the largest to the smallest when median conditions are viewed. Few companies have suspended interest or even dividends despite the fact of downward rate revisions meeting costs coming up.

Net earnings for all sizes of companies stand on the average between 0.15 and 0.20 of gross earnings. The notable feature here is that the spread from maximum (0.39) to minimum (0.02) is practically the same for large, medium and small units. The larger units do have, however, a slightly larger share of gross available for net.

Almost exactly the opposite ratio holds for the relation of book value to gross, namely, six to one. Here however, the spread between maximum and minimum is much narrower for the larger utilities. Thus out of six large units the spread was only from 3.8 to 7.6 times gross, whereas 46 smallest companies show a range of 2.05 to 19.2 in their latest reports.

Less consistency is reflected by surplus than any of the other major indexes derived. Very small companies

What Balance Sheets Show About 233 Utilities

Range of Gross Earnings	No. of Companies		Gross Earnings	Ratio of Book Value to Stocks, Fund. Debt	Ratio to Gross Earnings							
					Net Earnings*	Net Income†	Book Value	Stocks and Funded Debt	Surplus	Depreciation	Funded Debt	Stocks
Over $50,000,000	6	Max.	$92,090,797	3.07	0.34	0.47	7.58	6.63	1.78	0.14	3.35	4.04
		Av.	74,145,696	1.34	0.203	0.33	5.43	4.69	1.15	0.10	2.04	2.65
		Min.	61,399,000	0.82	0.06	0.16	3.81	2.10	0.69	0.07	0.82	1.28
$25,000,000 to $50,000,000	15	Max.	49,176,000	2.19	0.39	0.50	9.70	9.18	1.76	0.14	3.83	5.35
		Av.	33,151,933	1.23	0.18	0.35	6.31	5.37	0.98	0.09	2.74	2.63
		Min.	25,490,000	0.73	0.05	0.17	4.13	3.38	0.37	0.06	1.04	0.68
$15,000,000 to $25,000,000	15	Max.	23,564,724	2.12	0.32	0.49	11.80	12.03	2.38	0.16	6.31	5.93
		Av.	18,995,833	1.28	0.17	0.32	6.36	5.26	0.94	0.09	2.49	2.97
		Min.	15,144,000	0.97	0.02	0.19	3.43	1.61	0.15	0.04	0.49	1.12
$10,000,000 to $15,000,000	20	Max.	14,893,000	2.60	0.34	0.52	12.02	11.54	3.26	0.16	6.94	4.60
		Av.	12,093,711	1.17	0.16	0.34	6.76	6.16	1.18	0.09	3.43	2.90
		Min.	10,136,000	0.80	0.03	0.19	4.18	1.92	0.26	0.03	0.85	1.07
$5,000,000 to $10,000,000	50	Max.	9,903,649	2.05	0.35	0.62	14.20	12.36	1.86	0.17	5.97	7.26
		Av.	7,181,754	1.17	0.16	0.36	6.91	6.06	0.95	0.09	3.22	2.91
		Min.	5,026,654	0.91	0.028	0.14	3.74	2.97	0.24	0.04	0.21	0.90
$1,000,000 to $5,000,000	81	Max.	4,858,780	3.74	0.36	0.51	14.75	14.60	5.38	0.22	7.38	11.35
		Av.	2,696,738	1.32	0.15	0.30	6.54	5.55	1.06	0.09	3.16	2.79
		Min.	1,096,000	0.54	0.002	0.13	2.24	1.02	0.07	0.02	0.23	0.39
Under $1,000,000	46	Max.	945,025	4.36	0.31	0.69	19.20	17.19	14.50	0.19	7.35	9.84
		Av.	458,274	1.42	0.16	0.28	6.27	5.08	1.75	0.09	2.98	2.78
		Min.	70,323	0.74	0.01	0.13	2.05	1.14	0.26	0.001	0.45	0.73

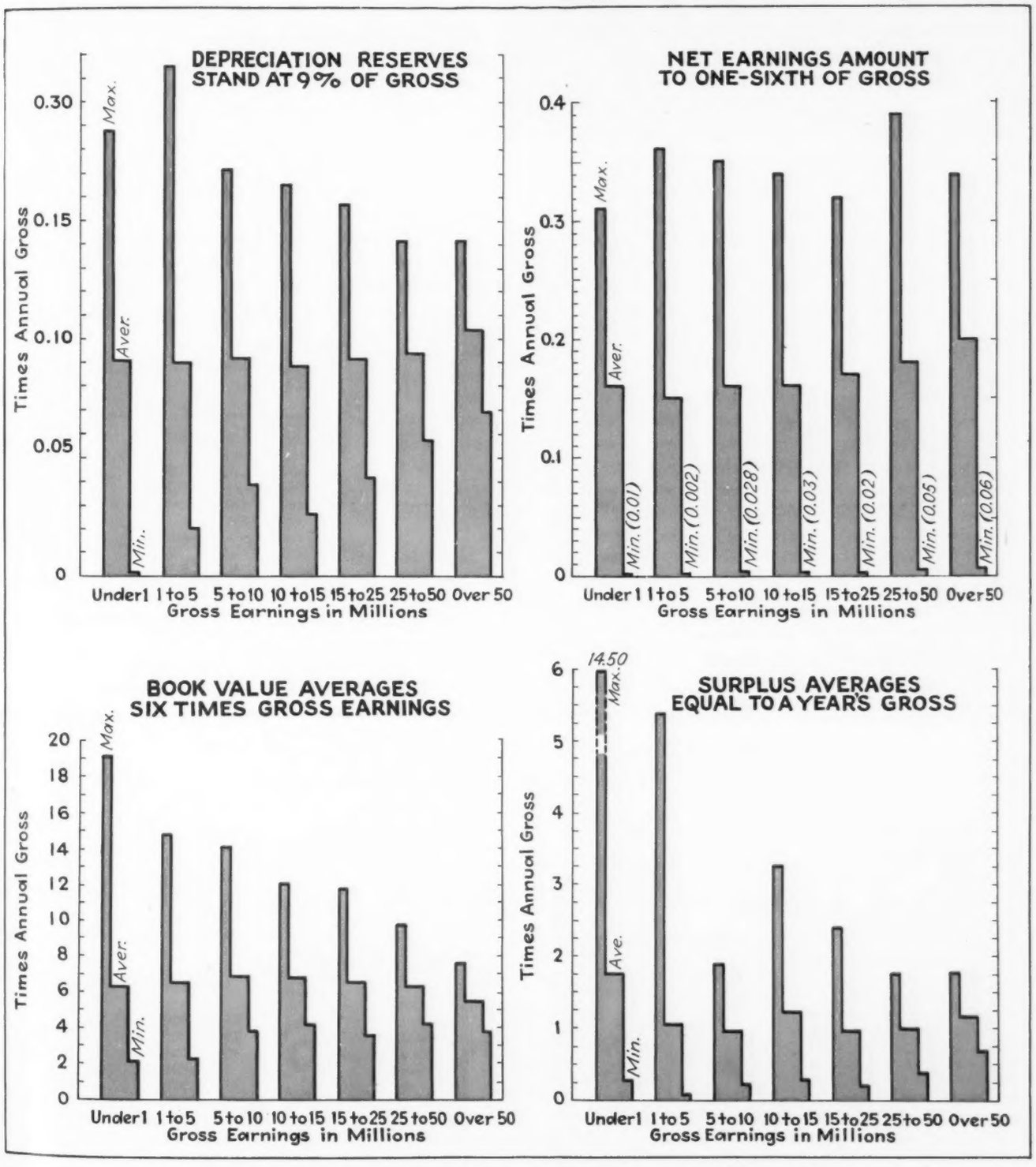
*Available for stock dividends and surplus after all charges.
†Net return on total capital (net earnings plus bond interest and expenses on capital).

Show Healthy Finances

seem to carry higher surpluses, but from above $1,000,000 to above $50,000,000 annual gross the average surplus ratio stands at within 18 per cent of being equal to a year's gross.

Depreciation reserves average consistently between 8.86 and 10.36 per cent of a year's gross.

Almost exactly $2,000,000,000 of gross is embraced by the table and charts and thus the analysis is a comprehensive index of operating utilities. Many, of course, have gas, railway and other sources of income. These data are for operations in 1934.



Analysis of Bulk of Industry Discloses Financial Well-being

Manufacturers Expect Better Business

Equipment

Value of Products $850,000,000 in 1935

Expectations of $925,000,000 in 1936

All Classes of Equipment Moving

AN UPTURN from the depression values continues in electrical manufacturing. The census value of products in 1933 was $549,983,599. This went up steadily, according to ELECTRICAL WORLD estimates, to $700,000,000 in 1934, to $850,000,000 in 1935, and reports indicate a figure of $925,000,000 for 1936.

These index figures do not include all classes of products nor retail sales prices. Making allowances for these elements, it is safe to say that electrical manufactures caused a business turnover of about $2,500,000,000 in 1935 and will create a business of at least $3,000,000,000 in 1936. This is a very important influence upon national recovery and employment and shows that electrification in this country is growing at nearly the normal rate. Only the absence of the utilities from the buying group for their normal expenditures holds down the total and, as shown by the utility budget figures for 1936, this group, even with only necessity buying, is coming into the market rapidly.

The present business is found in all classes of products, but distribution equipment and appliances take the lead in increases. Industrial and heavy utility equipment are coming into demand, however, as shown in the accompanying table, which gives a composite total from the reports to ELECTRICAL WORLD on sales in 1935 and expectations of sales in 1936.

Balance sheets are black in electrical manufacturing. Despite increased costs and some threats of labor troubles, this group is optimistic in attitude and aggressive in action. They have survived the depression effects and are eager to go ahead to greater prosperity.

In looking over the business estimates for next year, as tabulated in

Appliance Sales in 1935

(Wholesale Values)

Lighting equipment	$72,000,000
Portable lamps and shades	42,000,000
Radio sets, 5,500,000	130,000,000
Refrigerators, 1,600,000	160,000,000
Wire and cable	140,000,000
Counter appliances	8,000,000
Miscellaneous appliances	24,000,000
Ranges, 215,000	15,000,000
Vacuum cleaners 900,000	27,000,000
Electric washers, 1,400,000	56,000,000
Electric ironers, 140,000	5,600,000
Water heaters, 150,000	9,000,000
	$688,600,000

Estimates of Major Product Sales in 1935 and 1936

Class of Product	1935	1936	Per Cent Increase
A.C. generators, inc. generator end of prime movers	$25,000,000	$35,000,000	40
Synchronous condensers and frequency changers	2,200,000	3,000,000	36
Motor-generator sets	5,000,000	7,000,000	40
Distribution transformers, 1.5 to 500 kva	15,500,000	20,700,000	27
Power transformers, 500 kva. and up	8,000,000	12,000,000	50
Instrument transformers	2,500,000	3,200,000	28
Induction motors, polyphase and single phase, 1 hp. and over	35,000,000	42,000,000	20
Fractional-horsepower motors	32,000,000	38,000,000	18
Synchronous motors	3,000,000	4,200,000	40
Switchboards and accessories	12,500,000	15,000,000	20
Metal-inclosed switchgear	4,000,000	4,500,000	12
Circuit breakers*			
Oil	8,000,000	10,000,000	25
Air	1,000,000	1,500,000	50
Disconnect switches*	3,000,000	4,000,000	33
Knife switches*	1,200,000	1,600,000	33
Meters*	15,000,000	18,000,000	20
Arresters	3,000,000	3,600,000	20
Induction regulators*	2,000,000	2,800,000	40
Furnaces, industrial	4,500,000	5,000,000	9
Industrial heating devices, other than ovens and furnaces	3,000,000	3,800,000	26
Welding apparatus and supplies	11,000,000	13,200,000	20
Industrial control	29,000,000	32,000,000	15
Conduit and fittings	40,000,000	44,000,000	10
Insulators*	1,500,000	1,800,000	20
Cable, underground	25,000,000	29,000,000	16
Total	$291,900,000	$354,900,000	

Average increase of 21.6 per cent over 1935.

*Not included in switchboards.

Sales Increase 21 per Cent

terms of sales value, it may be noted that all classes of equipment are expected to be quite active. Generating equipment in particular is expected to be in demand because of increased need for capacity. Distribution transformers continue to be in demand and indications point to a large increase in power transformer sales. New customers and rebuilt services are calling for a large increase in meters. Rural extensions and revamped distribution systems call for a great amount of miscellaneous equipment. Industrial modernization and the building of new factories call for motors and control in mounting volume. It is quite significant that every type of product is expected to be in greater demand in 1936.

An evidence of the popularity for electricity in the homes is found in the splendid appliance business done in 1935 and the expectations for 1936.

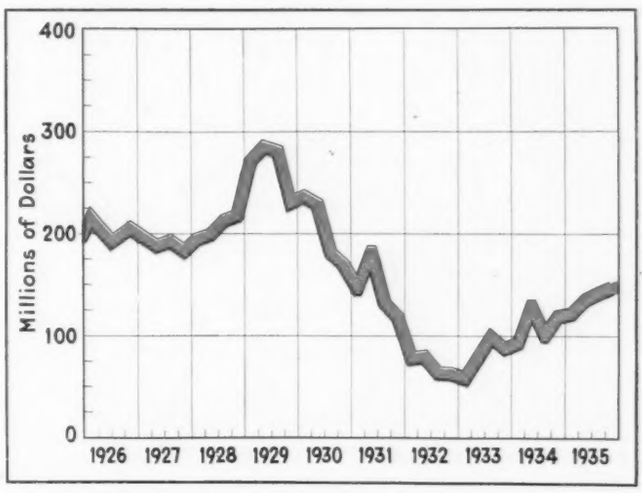
The table shows an estimated business in a selected group of appliances of $688,600,000 at wholesale prices. Reports on this class of equipment indicate expectations of at least a 25 per cent increase for 1936 sales, or about $860,000,000. On a retail basis of sales these figures may be estimated as at least $1,000,000,000 for 1935 and $1,300,000,000 for 1936.

It should be noted that the figure of $925,000,000 given for business in 1936 is measured in the Census "value of product" classification only and this is not wholesale or retail price. There is little meaning to this figure except as an indicator of manufacturing activity in sales and employment.

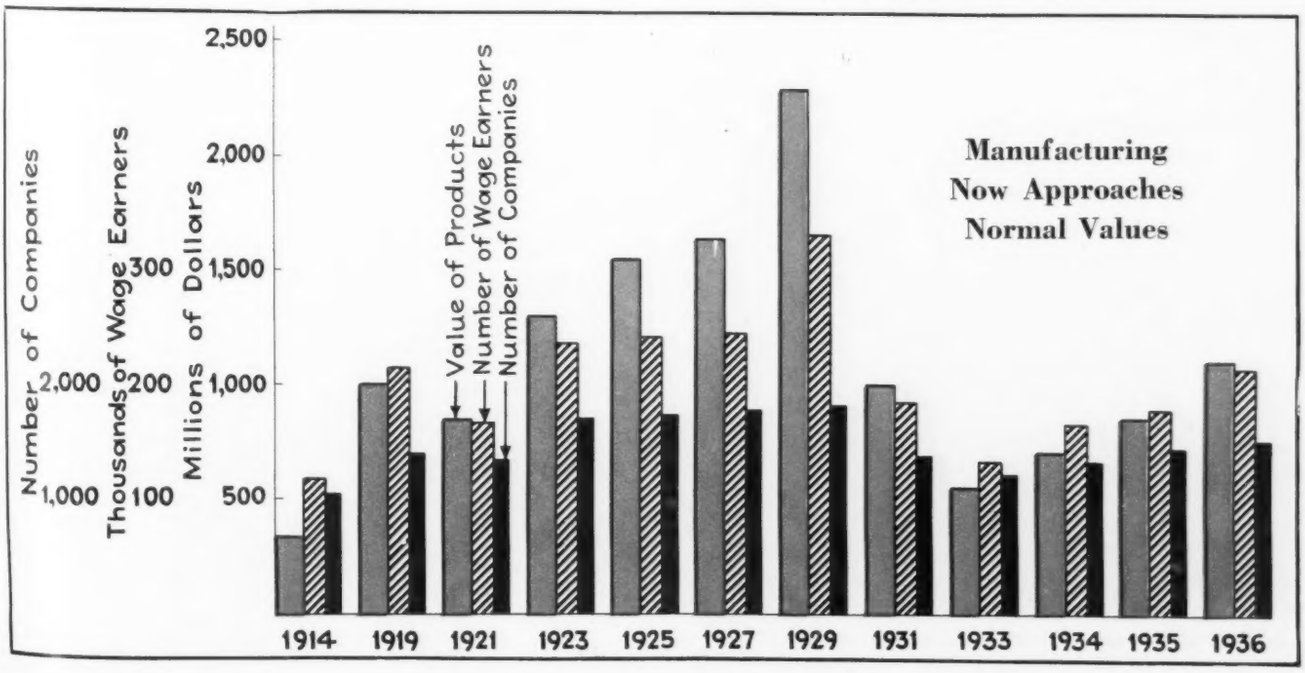
Sales Billed Continue Rise

	Years Ended Dec. 31— 1933	1934	First 9 Months 1935
General-Electric..	$136,637,268	$164,797,317	$149,173,275
Westinghouse.....	[a]66,431,592	92,158,894	92,019,563
Allis Chalmers....	13,286,768	20,287,148	27,468,984
Maytag.....	8,589,053	14,716,708	12,564,947
Fairbanks-Morse..	8,907,945	12,551,466	[b]7,452,715
Cutler Hammer...	3,655,367	5,117,883	[b]3,353,036
Black & Decker...	[c]1,705,414	[c]2,731,339	[d]2,977,266
Formica Insulation	1,242,606	1,598,170	1,541,628

[a]Revised. [b]Six months ended June 30.
[c]Year ended Sept. 30. [d]Ten months ended July 31.



Orders Booked by Manufacturers
(U.S. Department of Commerce)



Utility

J. F. PORTER
Kansas City Power & Light
J. F. OWENS
Oklahoma Gas & Electric
G. M. GADSBY
Utah Power & Light
J. H. SHEARER
Penn Central Light & Power
J. C. HOLTZCLAW
Virginia Electric & Power
SAMUEL FERGUSON
Hartford Electric Light
G. N. TIDD
American Gas & Electric
ALEX DOW
Detroit Edison
B. I. BUDD
Public Service of Northern Illinois
J. E. DAVIDSON
Nebraska Power
J. S. WISE, JR.
Pennsylvania Power & Light
F. M. TAIT
Dayton Power & Light

Executives View Business

Leaders in All Sections Say Business Prospects Are Encouraging — Public Relations Improving — Suggestions for Local Action to Improve Utility Prosperity

ON TOP of the encouraging business situation for utilities lie many political and financial aspects of the business that seriously affect its position. But even here there appear to be a clarification and an improvement that augur well for the future. But the base of the structure lies in the operating properties, and ELECTRICAL WORLD asked representative executives to comment on conditions and to give their opinions about business and about industry problems. An analysis of these replies gives a very encouraging outlook for all aspects of the business. It is being rebuilt on the firing line of customer service and contacts.

Outlook for Business

IN EACH territory the outlook for general business for 1936 was sought and the replies are almost unanimous. The question was put in the form of poor, fair and good. No one said poor. Those saying fair were Alex Dow, Samuel Ferguson, Joseph F. Porter, J. F. Owens, J. S. Wise, Jr., Frank M. Tait and G. M. Gadsby. Those believing that the outlook for 1936 business in their territories is good were Britton I. Budd, J. S. Holtzclaw, G. N. Tidd, J. H. Shearer.

All reports thus indicate that general business in all territories appears quite promising for 1936, and of course the electrical business in these regions will reflect these conditions at least as to output in even greater measure. A corresponding increase in net earnings of utilities, however, will be affected by the local conditions as to rate and cost levels. But the evidence is unmistakable that business is on the up-grade in all sections.

A definite request for opinions on the classes of electrical business that offers greatest promise of increase did not bring a wide variation in replies. In general, all classes of business are expected to be active. Some typical replies are as follows:

A balanced upturn about in accord with present distribution of sales—Alex Dow. In order of promise, domestic, industrial, commercial and rural—Britton I. Budd. Domestic and commercial—Samuel Ferguson. Domestic, industrial, commercial and rural—Joseph F. Porter. Domestic and commercial—J. S. Holtzclaw. Domestic, industrial and rural—George N. Tidd. Domestic, commercial, rural and industrial—J. S. Wise, Jr.

Opportunities for co-operation

SUGGESTIONS for co-operative action by the utilities in (a) marketing and (b) developing better national relations were given and of course reflect a wide variety of opinion:

(a) I do not believe co-operative action in marketing is feasible; (b) the national situation will be improved by each individual company improving its local conditions.—BRITTON I. BUDD.

(a) A re-establishment of an organization such as N.E.L.A., particularly geographic division set-ups, that would furnish a vehicle for the exchange of ideas and conferences between those utilities in contiguous territory; (b) the defeat of the present socialistic régime.—J. F. OWENS.

(a) Now doing well; (b) change your national politicians.—JOSEPH F. PORTER.

(a) No suggestion; (b) make low rates for liberal use instead of low political rates for small use.—SAMUEL FERGUSON.

(a) First, reasonable rate structures to permit usage, then satisfactory long-term financing arrangements which would produce volume sales and consequently volume manufacturing costs and lower costs to consumers; (b) nothing but the development of better local relations. National opinion is a composite of millions of individual opinions. National politics reflects what is believed to be the composite of individual thought.—J. S. HOLTZCLAW.

(a) A liberal policy in financing, good advertising and hard work; (b) attend to local public opinion.—GEORGE N. TIDD.

(a) Put the "Liversidge" plan into operation; (b) put the "Liversidge" plan into operation.—J. S. WISE, JR.

(a) Get back to the old order of having geographical divisions and organizing commercially to sell service and to merchandise by co-operative selling; (b) the industry really to act like an organized body, to make plans and to carry them out completely and forcefully.—AN EXPERIENCED EXECUTIVE.

These suggestions clearly indicate a quite general sentiment in the field that positive action today embraces the following activities:

1. Intensive work on local properties on a co-operative basis, for improving selling and public relations.
2. Some form of organization that permits regional and possibly national marketing to be done on a co-operative basis.
3. Build the national situation into a more favorable condition through work on local properties that has its foundation in greater electrification, better service and better relations with customers.

Handicaps to Overcome

AN EXPRESSION was sought on the greatest handicaps to be overcome (a) locally and (b) nationally in the endeavor to get a profitable expansion of the utility business. This

was a difficult question to answer, but a few replies are indicative of opinion.

(a) Lack of home buildings; (b) only affected in a general way by the national situation.—BRITTON I. BUDD.

(a) Unemployment and short hours; (b) fear of what Roosevelt may do in the way of centralized control and expenditures.—SAMUEL FERGUSON.

(a) No unusual handicaps except buying capacity; (b) place men in charge of national affairs who know the business and have them honest and practical.—JOSEPH F. PORTER.

(a) Lack of a feeling of security on the part of those who ordinarily would be venturing investments; (b) the present Administration, with its bitter antipathy to privately owned utilities and its strong attempt to bring about public ownership.—J. F. OWENS.

(a) Cost of domestic appliances is the greatest obstacle in developing low-use domestic customers—J. S. Holtzclaw.

(a) Nothing particularly outstanding; (b) uncertainty because of Washington.—GEORGE N. TIDD.

(a) Uncertainty of the anthracite situation, (b) uncertainty as to the Administration's attitude toward business.—J. S. WISE, JR.

It may be noted that some local industrial uncertainties exist, but that in general the local conditions are quite favorable except for the reflection of the policies established in Washington. It is apparent that if these policies are made favorable to business, made stable and made fair with respect to the utilities there will be given a great impetus to recovery and employment.

Public Relations Improving

OPERATING executives were asked if (a) local and (b) national utility public relations were improving, deteriorating or unchanging. This is a difficult question to answer because it is difficult to measure these values. Mr. Budd believes that both local and national public relations are improving. Mr. Ferguson also believes that both local and national public relations are improving. Mr. Porter says local public relations have continued good and without complaints and to improve the national situation says "stop this false ballyhoo." Mr. Owens believes there has been no change in local and national public relations. Mr. Holtzclaw says local public relations are good and national relations are improving. Mr. Tidd also believes both local and national public relations are improving and Mr. Wise agrees to this statement.

These statements, together with other reports, indicate clearly that local public relations of utilities are good and are steadily improving. This is a very encouraging condition that will be certain to reflect itself on national policies with respect to utilities.

Sample Conditions Encouraging

IN ADDITION to these questions to some executives others were asked to give a general picture of the business outlook in the territories they serve in some detail. A sample of these replies is indicative of the general situation:

Favorable in Pennsylvania

General business conditions and industrial activity in central Pennsylvania are favorable. The Pennsylvania Railroad has ordered 3,300 freight cars to be built in Altoona, providing continuous employment for 2,000 men. Our kilowatt-hour sales are running about 14 per cent ahead of 1934. Retail business is showing a substantial improvement. The outlook is encouraging and we expect a continued expansion of business activity.—J. H. SHEARER.

Ohio slowly improving

General business conditions in this territory are showing definite signs of a gradual, slow improvement and our company feels inclined to consider seriously additional electric generating capacity for use about May, 1937.—FRANK M. TAIT.

Prospects good in West

The Intermountain territory we serve is primarily dependent upon agriculture, metal and coal mining. A dry fall was discouraging for agriculture; but the winter storms can yet provide the precipitation essential for irrigation; if they do, then next year's prospect is brighter than for the past six years. In mining the copper outlook is fine, silver also is good on account of the government's determined price lead, but zinc requires further price improvement. Sales of general mercantile lines are improved now, with a reasonably promising outlook. Business building remodeling is in fair volume, but house building is slow in starting, although a real demand exists that should occasion a marked increase next year. Our sales budget, including dealer activity, contemplates total merchandise sales of $4,700,000, an increased residential and commercial energy output of 13 per cent. Preliminary plans call for increasing our power generating equipment.—G. M. GADSBY.

Detroit area upturn

The prospects for an increase in general business in our territory are fair and the distribution thereof is likely to be much in proportion to the present distribution. We have had a marked increase in our heavy industrial power because of the activities of the motor industry and its associated industries. We will be content if we have a continuance thereof, even at a slower rate.—ALEX DOW.

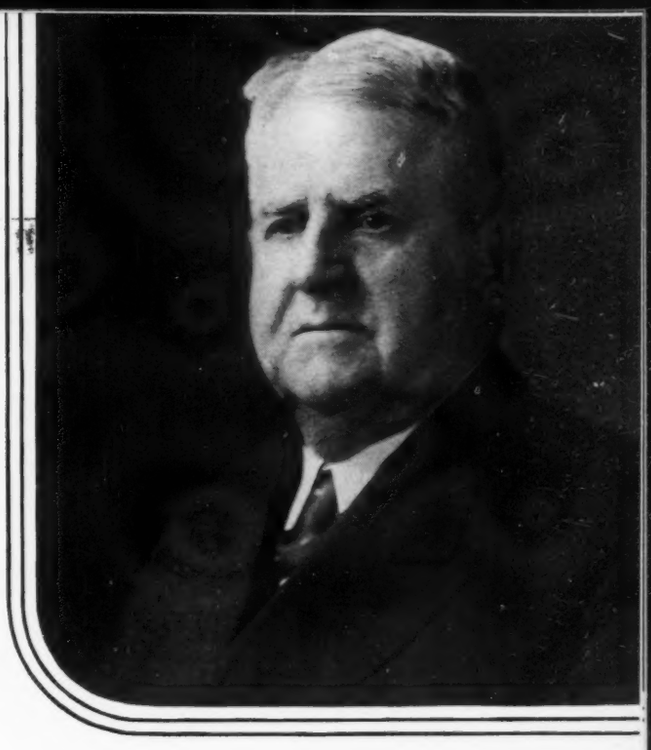
In all sections the story is the same. Despite uncertainty as to the fundamental economic and political stability of the present business situation there is nothing tangible in sight to discount the prediction that business will advance in the coming months and that the utilities will reflect this advance by making gains in all classes of business.

Utility Prospects Improved

As pointed out by Mr. McCarter in this issue, the utility situation faces contradictory trends. On the properties business is better and public relations are improving so that the future looks to be prosperous. At Washington, on the other hand, both the recent legislation and the maintained anti-utility sentiment offer difficult handicaps to overcome.

A study of these opinions and of the fundamentally healthy trends indicates, in our opinion, that the utilities are on the way out of their troubles but that increasing hard work and vigilance must be maintained to achieve freedom and prosperity.

Contradictory Trends in 1935



By THOMAS N. McCARTER
President Edison Electric Institute

A REVIEW of the electric light and power industry during the past year discloses two contradictory trends. From the short-term standpoint, the operating results in 1935 showed improvement on every hand. From a longer point of view, the year marked the further approach of a possible crisis between the utilities and the federal government and the attempted imposition of the sentence of death upon some of the utility holding companies.

The immediate effect of the political attacks upon the power and light industry has been to add greatly to the uncertainties of the future, with the result of the postponement of most things which are not of immediate pressing concern. New financing and new construction remain at the lowest levels of the depression and the downward trend of rates, whereby the benefits of improved engineering and management have been passed on to the consumer, has slowed down since the passage of the Public Utility Act. In one respect, however, the stockholders of the industry have been benefited from the hesitation of current business, in that the low level of interest rates resulting from the accumulation of unproductive funds has enabled many companies to refund part of their indebtedness at lower figures.

The electric light and power industry has shared in the recovery of general business which continued throughout 1935. By August, output was back again to pre-depression levels. During December it exceeded the 1929 figures by nearly 8 per cent and established a new high record for electric power production. New-high records were made in the extension of service to the homes and farms of the country and in the use of this service by the individual consumers.

On the other hand, the long shadow of government competition moved appreciably closer during the year. The highly unfavorable factor of further appropriations of federal funds to develop water power in competition with private capital invested in plants already amply able to serve their communities was accentuated by subsidies from the federal treasury to municipalities to set up electric plants in opposition to those operating under franchises properly granted. The most significant event of the year was the passage by Congress of the Public Utility Act of 1935, providing for far-reaching changes in the organization and operation of the industry, for its practically complete regulation by federal agencies and for the dissolution of a large proportion of the holding companies. The validity of this act has been challenged and the litigation already begun will ultimately reach the United States Supreme Court.

Operating results encouraging

A new high record was set in the sale of more than 1,500,000 electric refrigerators and the use of lighting was further stimulated by the continuation of the Better Light-Better Sight promotional campaign. Large gains were also made in the sales of ranges, washing machines and some of the smaller household appliances. The further extension of lines to rural areas and the return of "doubled-up" families to their original status resulted in the addition of 500,000 domestic users, and, as a result of these factors, the total sales of electricity for domestic use exceeded the figures of the previous year by 8 per cent, and established a new record of about 13,875,000,000 kw.-hr.

Production record made

The entire production of electricity in 1935 for all public purposes (including subways and traction systems) is estimated at 99,000,000,000 kw.-hr. —an increase of 9 per cent over 1934 and 2 per cent over the previous high point reached in 1929. Industrial power sales were up 11 per cent, reflecting the increase in factory production during the second half of the year, but sales in this classification were still 10 per cent below the year 1929.

Commercial sales reflected the slower rise in retail trade and showed an increase of 7 per cent over 1934. Street lighting, while up 6 per cent from the previous year, was still below the figures for the depression years of 1931 and 1932. Sales of electricity for street railway purposes were the same as for 1934, while current used by electrified steam railroads increased by 16 per cent, largely as the result of the completion of the Pennsylvania

[*Continued on page 109*]

Good

C. K. KING
Ohio Brass Company
B. W. KERR
Railway & Industrial Engineering Company
GERARD SWOPE
General Electric
F. R. BACON
Cutler-Hammer, Inc.
C. L. PEIRCE
Hubbard & Company
C. A. BURNHAM
Condit Electrical Manufacturing Corp.
J. S. LAPP
Lapp Insulator Co.
O. H. FALK
Allis-Chalmers
F. W. MAGIN
Square D Company
H. D. KERESEY
Anaconda Wire & Cable Company
EDMUND LANG
Crocker Wheeler
F. A. MERRICK
Westinghouse Elec. & Mfg.
P. F. WILLIAMS
G & W Electric Specialty Company

Outlook for Manufacturing

All Markets to Be Active—Facilities Taxed to Supply Demands—Price Levels to Be Stable —Opportunities for Co-operative Marketing

AT THE REQUEST of ELECTRICAL WORLD, representative electrical manufacturing executives replied to a series of questions on the business outlook. A notable note of optimism is evident in the replies. They are brief but positive. This optimism is supported by confidential reports on product sales for this year and expectations of sales for next year.

All this evidence indicates that the manufacturers have the spirit and the determination to make the most of the present business opportunities. While not brought out in all replies to the general questions, many reports have been heard to the effect that facilities and skilled labor would be stressed to the utmost to supply heavy equipment, such as turbo-generators, in time to meet the needs of customers, and we have been urged to state that commitments for this type of equipment be made as early as possible because of the conditions confronting the manufacturer and his suppliers. Another indicator of a general business revival is found in the opinion of the manufacturers that they expect all markets for electrical products to be more active in the coming months.

This branch of the industry is well organized and ready to move ahead. Manufacturers would welcome as well as participate in any co-operative marketing endeavor embarked upon by the industry as a whole, but have few tangible suggestions for this type of co-operation. To an unusual degree this is also true of the wholesaler group, which is organized and ready to act if programs are presented. Some proposals are in the offing to take advantage of this encouraging situation and it is urged that the present co-operative programs be continued on an increased scale of magnitude.

Detailed Replies to Questions

Business Prospects—Status of Facilities—Level of Prices—Where to Co-operate

1. What is your opinion on prospects for an increase in electrical product sales as a whole in 1936?

This question was put in form for reply as poor, fair, good and very good. Not one manufacturer said business would be poor. Those who said business would be fair were Edmund Lang, P. F. Williams, George Burnham and F. W. Magin. Those who said business would be good were F. R. Bacon, H. D. Keresey, J. S. Lapp, C. K. King, Otto H. Falk, B. W. Kerr and F. A. Merrick. Those who said that business would be very good were C. L. Pierce and Frederick Holmes. This question applied to the electrical business as a whole and it is readily seen that the replies indicate that good is about the best word to describe expectations for business.

2. In what markets do you look for the greatest activity in sales in 1936?

F. R. BACON *says:* Home, industrial plants, utilities and the government.

H. D. KERESEY *says:* Home, farm, commercial buildings, industrial plants and government.

J. S. LAPP *says:* Farm and government for insulator sales.

C. K. KING *says:* Farm, utilities and the government.

EDMUND LANG *says:* Commercial buildings, industrial plants and the government.

C. L. PIERCE *says:* Home, utilities.

OTTO H. FALK *says:* Utilities, home farm and industrial plants in order of magnitude.

P. F. WILLIAMS *says:* Home, utilities and government.

GEORGE BURNHAM *says:* Farm and utilities.

B. W. KERR *says:* Utilities, home, farm.

F. W. MAGIN *says:* Home, commercial buildings and industrial plants.

F. A. MERRICK *says:* Home, farm, utilities, industrial plants and government.

Making allowance for product specialization and types and the special knowledge of these men of the markets it is quite evident that all of the markets for electrical products will be active. And it is especially noticeable that the opinion exists that utility buying will be active. This conclusion is supported by other data in this number.

3. Do you believe that manufacturing facilities will be adequate to supply the demand for all products that will be needed by purchasers within a reasonable delivery time?

The replies were practically unanimous as "yes," with some qualifications. Mr. Merrick says that equipment for turbo-generators may be overtaxed if commitments are put off to the last possible date. Mr. Burnham said "yes" if raw materials are available on short deliveries and Mr. Holmes says there are a few exceptions to his "yes."

Undoubtedly most manufacturing facilities are still below their capacity, except possibly those making meters, distribution transformers and some appliances, and the volume of production can be increased quickly and greatly with present equipment. It is pointed out that in the heavy special devices, such as turbo-generators, both manufacturers and their suppliers are out of

practice in production, so to speak, and a long time period is required in manufacture. Despite the general opinion that facilities are ample, it is evident that if business continues to increase at the present rate at least some products will not be available for quick delivery in a demand market and some manufacturers are increasing inventories in expectation of this situation.

4. Are your suppliers in position to supply you with the required volume of products quickly?

All answer "yes" with some exceptions, such as some classes of steel and insulation.

5. Do you believe that an increased volume of business will result in any lowering of price levels in 1936?

As would be expected, some interesting comments are had on this question, which is semi-speculative. Eight say "no," two say "yes" and three expect a price increase. Some typical qualifying comments are:

"Present prices to utilities on our products are based on a normal volume of production which does not yet exist; too many extraneous costs, such as S.E.C. tax and increasing raw material prices exist to permit price reductions; cannot help but think that the labor situation as it will develop will prevent price reductions; inflationary governmental procedures will more than counter-balance the effects of increased volume; lowering of prices is due, but increased volume will be offset to some extent by increased costs; prices will increase rather than decrease because inflation will raise the prices of labor and raw materials."

It is evident that inflation is in the offing, at least to some extent in many minds, and that the labor situation also is considered serious so that no predictions of price reductions based on an increased volume of business can be made at this time with any degree of confidence.

6. What suggestions do you have for opportunities in marketing through co-operative action by all branches of the industry?

This is a broad question and difficult to answer definitely, but the replies are significant of prevailing opinion within the limits of such a broad and rather blunt inquiry.

H. D. KERESEY *says:* "Past efforts of the industry to co-operate have been unsuccessful due to differences of opinion."

F. R. BACON had nothing to suggest.

J. S. LAPP *says:* "Sorry to be so sterile."

C. K. KING *suggests:* "Information on farm line practices through information in ELECTRICAL WORLD as to activity on definite projects."

EDMUND LANG *says:* "Electrical industry is too broad in scope to permit adequate co-operation," and adds that the type of co-operation should be action.

C. L. PIERCE has no suggestion.

P. F. WILLIAMS *says:* "I do not believe in forced selling—just a steady honest representation and the type of co-operation should be honest and unselfish relations between all members in a class of the industry."

OTTO H. FALK has no suggestions for co-operation in marketing because his company makes heavy equipment only.

FREDERICK HOLMES *suggests:* "Modernization of services and outdoor metering and extension of network systems." He thinks the type of co-operation should be "improved products by manufacturers of meters, cable and fittings, combined with aggressive acceptance by utilities after careful analysis of worth of such products. Jobber and contractor dealer support is warranted because better services expand their markets for air conditioning, ranges, etc."

GEORGE BURNHAM *suggests:* "Greater use of energy-consuming devices."

B. W. KERR *suggests:* "Appliances and devices for the home through displays, demonstrations and the pushing of the modernization idea."

F. W. MAGIN *says:* "I do not believe much can be done by the electrical industry as a whole."

F. A. MERRICK *says:* "Co-operate with utility marketing programs, since all parts of the electrical industry should aid the utilities in their effort to reach a stabilized basis of operation."

These questions and answers afford a competent cross-section of thought by electrical manufacturers. We appreciate their co-operation in enabling us to make them available to the industry.

Robertson Says Industry Improves

DURING 1935 industry has employed more men, paid more wages, more dividends and more taxes than for many years previously. It is a good record. It is a great tribute to American business. Regardless of the many obstacles encountered, through everlasting effort, a fresh foothold has been gained and we have reason to believe that improvement will continue. The human body will throw off diseases in spite of mistreatment. So it would seem to be with business. It has slowly convalesced and is able to stand up and walk again. With returning health, its steps will grow stronger and firmer.

The electrical industry has shared in this improvement to the extent that practically all companies in the industry are once more operating in the black after several years of unsatisfactory earnings.—A. W. ROBERTSON.

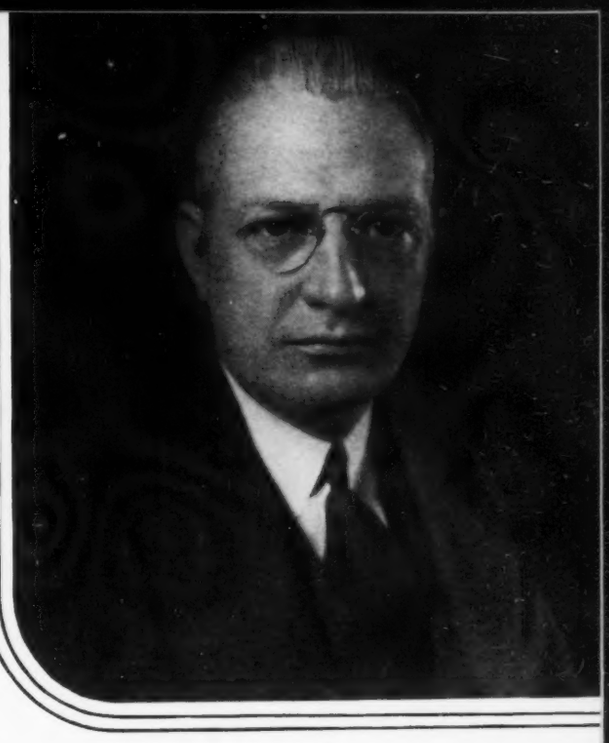
Swope Looks for Continued Gains

THE volume of electrical manufacturing business in 1935 was approximately 30 per cent greater than in 1934, which was about the same increase as was shown for 1934 over 1933. Consumption of electricity in the United States was the greatest in the history of the country, being about 7 per cent more than in 1934 and 3 per cent more than in 1929, the previous peak year. As I said last year, this has been due largely to increased use of electrical appliances in the home.

Orders for capital goods in the electrical manufacturing industry have not increased to any great extent, because of the difficult position of the public utilities and transportation companies throughout the United States. Practically the only increase in the production of capital goods has been brought about by the modernization of industrial plants. Successive increases in the use of electricity must eventually mean an increase in the generating capacity of public utilities, which will bring an increase in orders for capital goods.

For the year 1936 we look forward to a continued improvement in business.—GERARD SWOPE.

Seize the Opportunity



Brains and Courage Will Take Advantage of Our Electrically Conscious Public to Re-establish Industry Position and Prosperity

By F. C. JONES
President National Electrical Manufacturers Association

BUSINESS is better. We are now able to look "around the corner" and see prosperity in the distance. Recovery is on the way. All the signs and fundamental statistics point to the fact that we are on the up-grade to recovery and have progressed well up the slope from the valley of the depression. This is true of all business and all industry.

We, in the electrical industry, have much to be thankful for; we are in the front ranks of the march to recovery, and occupy one of the highest positions on the up-slope. Our industry is today in the soundest condition that it has been in for the past five years and faces a future with greater possibilities for growth than ever before, with almost limitless possibilities for further expansion.

We have completed the period of proving our economic value and our prospective customers are sold on the utility and advantages of our respective wares and services. We are in the enviable position of facing an electricity conscious population which is eager to utilize our various comfort-producing and labor-saving devices and services and has demonstrated its desire by increasing purchases, even during a period of very restricted and lessened incomes. All business and all services are in competition for the consumers' dollar, and if ever an industry had a golden opportunity sharply to increase the percentage it receives of the consumers' dollar the electrical industry has it today.

We must continue and even increase the great work that we, as an industry, have been doing along the lines of new, useful inventions and increased applications for electricity. We must continue to improve all our products, advance our methods of production and lessen our over-all costs, so that we can continuously give the consumer greater value for his dollar and more desired products per dollar. Concentration and continued application to these principles cannot help but give us a steadily growing percentage of the available total dollars.

We can go a step further and help increase the total number of available dollars in the hands of the consumer by helping to increase the total income of our country.

Scarcity doctrine false

During the last few years theorists and politicians have been preaching the doctrine of scarcity; of less production of everything; of less work by every one. The experience of centuries has proved that the only source of wealth and income is through increased production of all goods, and this can only be attained by greater mental and manual labor on the part of every one. We must do our part to re-establish with ourselves, and all the people of our country, these few simple basic economic truths, and continually to hammer home that no nostrums, no theories, ever conceived or invented have proved a satisfactory substitute for honest, productive work as a means of restoring prosperity and increasing total wealth and income.

If we will do our part in this teaching of sound economics, we will find that the people will decide it is time to ignore the theorists and politicians and go to work to create wealth. There will then be a greater total of wealth and dollars in the hands of the consumers. We can do one other thing to improve the position of every man, woman and child in our country. Preach lower total taxation and less governmental spending.

Today more than 30 per cent of the total income of the country is paid out in taxation. Over one day in every four that we work we are working to pay the tax collector. Federal, state, county and municipal governments—in fact, all governmental agencies—have their hands in every one's pockets taking nearly one-third of every one's income. Many, and in fact the majority, of these taxes are hidden taxes; so carefully hidden that they are paid without a realization that they are taxes. Some of these taxes are necessary for the running of really essential services and functions of our governmental agencies and are, therefore, economically sound. Many, however, are sheer waste and governmental extravagance and the money they represent should be productively used in wealth- and employment-creating enterprises.

Public education needed

We must all pitch in and help educate the people to the direct benefits to themselves of lower taxation and less governmental spending. Show them

[*Continued on page 109*]

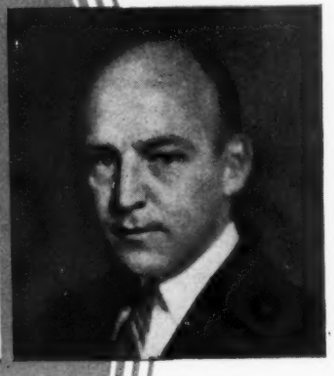
Utility Markets

H. E. YOUNG
Northern States Power Company

JULIUS DANIELS
Edison Elec. Illum. Company of Boston

C. A. COLLIER
Georgia Power Company

G. E. WHITWELL
Philadelphia Electric Company



H. M. SAWYER
American Gas & Electric Company

P. H. POWERS
West Penn Power Company

E. W. LLOYD
Commonwealth Edison Company

R. E. FISHER
Pacific Gas & Electric Company

H. P. J. STEINMETZ
Public Service Elec. & Gas Company

BUSINESS gains of 1935 are to be continued in 1936 according to reports from representative commercial executives. In reply to questions submitted by ELECTRICAL WORLD they gave complete agreement to both the possibility and expectation for increases in all classes of business this year. Especially promising is the domestic market with the widespread popularity of home electrification and the recent wave of rate adjustments to give an inducement to more use. Many sections report that the range in particular is on the verge of commercial acceptance comparable to that of the electric refrigerator. Other devices such as radio, air conditioning, lighting and shelf appliances are expected to be sold in even greater volume than in 1935 and water heating also will make a marked advance.

Commercial market prospects are based upon better lighting, ventilation, utility motors and air conditioning. In the industrial field renewed factory building activity results in making electric equipment sales and in addition there are new electrical products and controls that make necessary a great amount of industrial modernization.

The outlook for business is more than promising according to these replies and other available data; in fact, the rate of acquisition of new business by the utilities is dependent entirely upon the will of utility managements to put the necessary money and man power back of a complete sales program.

Detail Replies to Questions

1. In terms of energy sales, what approximate percentage increase in business do you look for on your property in 1936?

The replies are as follows:

	Domestic	Commercial	Industrial
H. E. Young	18	5	2
C. A. Collier	22	18	5
E. W. Lloyd (revenue)	4	3.5	4
P. H. Powers	14	17	6
G. E. Whitwell	12	8	8
H. P. J. Steinmetz	9	4	6
R. E. Fisher	8	10	8

Promising, Say Executives

Increase Expected in All Classes of Business—Domestic Gains to Exceed 1935—Plans for Selling Include All Devices—Special Emphasis on Heavy-Duty Appliances

This sample of expectations in several widely separated areas is indicative of the fact that despite large increases in 1935, commercial executives expect to equal or exceed the new business records of last year in the coming months. The large increases are expected in domestic and commercial classes of utility business.

2. In the domestic market what particular products or activities do you expect to be most active?

The replies, in order of importance, are as follows:

	Refrigerators	Ranges	Water Heaters	Lighting	Appliances	Air Conditioning
H. E. Young	1	1	1	1	–	–
C. A. Collier	1	4	5	3	2	6
E. W. Lloyd	1	–	–	2	4	3
P. H. Powers	3	2	5	1	4	6
G. E. Whitwell	3	1	2	4	5	–
H. P. J. Steinmetz	1	4	6	2	3	5
J. Daniels	2	1	3	4	5	6
H. M. Sawyer	1	2	3	4	5	6
R. E. Fisher	1	4	5	2	3	6

Relative pressure on the sales of the different appliances is valid only as a small variation in most instances so that, in general, a balanced program of selling is contemplated. The position of the refrigerator is easily first but it is notable that the range now rates about equal to lighting in importance. Two companies are stressing small appliance sales evidently striving to advance the status of the low use customer. Air conditioning in the domestic field apparently does not look extremely attractive as yet for several obvious reasons.

3. In the commercial markets what aspects or products promise to give the largest business?

The replies, in order of importance, are as follows:

H. E. YOUNG—Remodeled lighting, hotels, stores, office buildings, restaurants.

C. H. COLLIER—Air conditioning, motor applications, remodeled lighting, appliance applications, electric cooking, restaurants, stores, office buildings, hotels.

E. W. LLOYD—Remodeled lighting, air conditioning and ventilating, motor applications, small restaurant cooking.

P. H. POWERS—Stores, office buildings, remodeled lighting, hotels, electric cooking, air conditioning, motor applications, appliance application.

G. E. WHITWELL—Electric cooking, air conditioning, remodeled lighting, motor applications, appliance applications.

H. P. J. STEINMETZ—Air conditioning, remodeled lighting, hotels, appliance applications, stores, restaurants, office buildings, hotels electric cooking.

J. DANIELS—Air conditioning, remodeled lighting, stores, electric cooking, hotels, restaurants, office buildings, appliances, motor applications.

H. M. SAWYER—Remodeled lighting, air conditioning, electric cooking, stores, restaurants, office buildings, motor applications.

R. E. FISHER—Remodeled lighting, motor applications, appliance applications, stores, restaurants, hotels.

It is notable that either remodeled lighting or air conditioning takes first place with electric cooking a close follower. Some degree of repetition is found in this question but it is obvious that nearly every possible market in the commercial class is considered a possibility for new business.

4. In the industrial market what industries and what type of applications give promise of the largest business volume?

The replies, in order of importance, are as follows:

H. E. YOUNG—Remodeling of factories, additions to factories, industrial lighting.

C. A. COLLIER—Greater factory motorization, additions to factories, remodeling of factories, new industries, industrial lighting, electric heat, air conditioning.

E. W. LLOYD—Greater motorization, industrial lighting and air conditioning.

P. H. POWERS—Remodeling and additions to factories with greater motorization, electric heat, new industries, air conditioning.

G. E. WHITWELL—Air conditioning, electric heat, greater motorization, industrial lighting.

H. P. J. STEINMETZ—Factory additions, new industries, factory remodeling, greater motorization, air conditioning, industrial lighting, electric heat.

J. DANIELS—Remodeling of factories, greater motorization, industrial lighting, electric heat, factory additions, air conditioning, new industries.

H. M. SAWYER—Remodeling of factories, additions to factories, electric heat, motorization, new industries, air conditioning, industrial lighting.

R. E. FISHER—Industrial lighting, greater motorization, remodeling of factories, air conditioning, factory additions.

These replies reflect the types of industry and the local conditions found in the several areas but it is noticeable that factory additions or remodeling is a dominant market and new industries are indicated in several instances. The advent of air conditioning finds acceptance as a first order business opportunity in only a single instance and industrial lighting and electric heat are not stressed greatly although undoubtedly included in the factory remodeling and extension program. Here again a wide field of marketing is indicated premised upon business revival in industry together with competitive conditions that force a greater electrification.

Future Objectives

P. H. CHASE
Philadelphia Electric Company

N. E. FUNK
Philadelphia Electric Co.

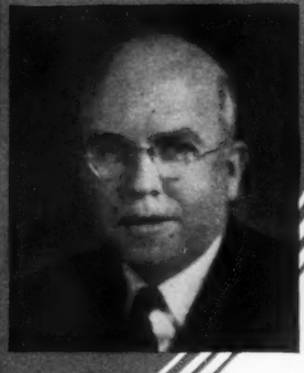
PHILIP SPORN
American Gas & Electric Company

J. H. FOOTE
Consumers Power Co.

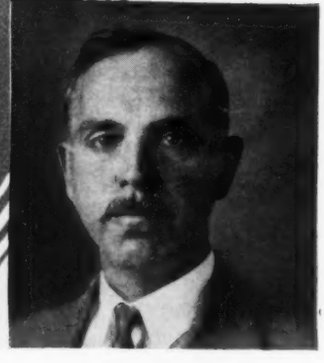
N. B. HINSON
Southern California Edison Company

ALFRED IDDLES
United Gas Improvement Company

M. T. CRAWFORD
Puget Sound Power & Light Company



H. P. SEELYE
Detroit Edison Company



P. W. THOMPSON
Detroit Edison Company

TWO things have stirred up renewed activity in electrical engineering circles. The first is a large up-turn in utility loads and the second is that renewed industrial activity calls for more capacity and larger service facilities. Also, during the depression manufacturers have brought out many new and improved engineering products that forced changes in present installations either by rendering obsolete existing designs or by reason of their making it necessary to use them to reduce costs.

Engineering in the electrical industry is by no means static or finished. A rebuilding job confronts the industry and, in addition, a host of new products and new ideas for equipment assembly are already here, with more in the offing. Experience as well as what is now going on show that there is no defense against technological progress except to use the new ideas and new things. They make for lower costs and improved service.

A brief survey of highlight developments and trends is given in the replies to questions submitted to outstanding engineers by ELECTRICAL WORLD. These replies permit of some conclusions and give food for thought in their diversity of opinion.

Trends in Power Generation

One of the most important aspects of engineering lies in the necessity to add generating capacity. Questions on this subject and the replies follow:

1. What outstanding developments in the art and practice occurred in 1935?

I know of nothing entirely new, although progress has been made in superheat control, higher steam temperature, welding of pressure piping, automatic air control to underfeed stokers, more satisfactory materials.—P. W. THOMPSON.

Manufacturers have continued their research and development work and there has been improvement in station operation during 1935, but no outstanding developments have taken place.—LOUIS ELLIOTT.

Very little not already reported.—ALFRED IDDLES.

I know of no outstanding developments in the art or practice in 1935.

in Engineering Developments

Power Stations Force Attention—More Transmission in Offing—Distribution Being Strengthened—New Equipment Available—Results of Service Applications Sought

due very probably to the continued business depression of the past several years.—N. E. FUNK.

2. Do you think developments to date warrant the use of high-speed (3,600 r.p.m.), high-pressure (1,200-1,400 lb.) and high-temperature (925 deg.) turbo-generators as standard practice?

Yes, under proper conditions, but not in all cases.—P. W. THOMPSON.

Yes, although for the present I would be inclined to limit steam temperatures to 900 deg.—LOUIS ELLIOTT.

Yes, with the possible exception that 850 deg. should be chosen unless one is willing to do a small amount of experimentation.—ALFRED IDDLES.

The satisfactory operating experience with 3,600 r.p.m. turbines, some of which have been installed for operation at from 1,200 to 1,400 lb. at temperatures lower than 800 deg. and other cases for operation at lower pressures but at temperatures of 850 deg., certainly warrants the use of such machines at temperatures somewhat in excess of present experience. Operation up to, say, 950 deg. should be satisfactory.—N. E. FUNK.

3. Do you think this trend in generation is toward (a) remodeling old plants, (b) building new plants, (c) larger stations and units, (d) smaller stations and units?

Remodeling old plants and use of smaller stations and units.—LOUIS ELLIOTT.

Answer is too dependent upon conditions of load growth, financing, character of load and many other things to be able to give an opinion.—P. W. THOMPSON.

Definitely toward remodeling old plants at the present time. Large stations and units to get lower unit costs when system size will permit.—ALFRED IDDLES.

The fact that there have been very few new installations in the past few years, either in remodeling of old plants or in new installations, provides but little on which to form opinions as to trends in generating installations. Probably the greatest activity lies in consideration of remodeling old plants, principally the superposition of high-pressure, high-temperature units on lower-pressure machines.

The decision as to the type of installations for new generating capacity must be made for each individual case. The space available in an old plant, age and type of steam generators to be replaced and the relation of the generating site to the load center and transmission facilities all have a very distinct bearing on the problem.

Several years ago there appeared to be a trend toward building very large generating stations with high-voltage lines to transmission substations, or to older generating stations which were operating as stand-by plants. In recent years, however, the tendency is to generate as much power as possible for each load area in that load area, confining transmission to generating station tie lines for economy and reliability.—N. E. FUNK.

4. What developments should be encouraged that promise to (a) reduce costs, (b) improve performance?

Cheaper materials for use under high temperatures are needed.—P. W. THOMPSON.

The development of outdoor-type steam plants, using some elements of designs from outdoor hydro-electric stations and oil refineries, should be encouraged. Forced-circulation boilers, permitting still higher unit evaporative rates, should be developed. Plant layout should be simplified and stations should be designed for life-capacity factor rather than expected initial-period factor.

In order to permit safe and reliable use of higher steam temperatures, giving better plant performance, research and experiment with respect to high-temperature alloys should be pursued. Operators should carry on plant-betterment work more intensively than in the past, looking to better economy and lower costs.—LOUIS ELLIOTT.

Standardization and simplification will reduce costs and higher superheat temperatures will improve performance.—ALFRED IDDLES.

Development of steam boilers and turbo-generators of high reliability, which require less frequent shut-down for inspection and overhauling, and therefore have high availability factors, will probably have the greatest effect on keeping down generating station costs. Developments along this line will increasingly permit the use of large units, with their resultant lower first and operating costs. Further development of outdoor generating station equipment and the simplification of indoor types may also offer possibilities for reduction in cost.

A very important development for efficient performance and lower operating costs lies in the control of superheat to produce as nearly a fixed temperature as possible at the turbine. —N. E. FUNK.

Economy in Distribution

In the realm of distribution there is great activity toward strengthening systems to carry the new loads, the use of standardization to reduce costs and the use of new devices and construction methods.

1. What outstanding developments in the art and practice have occurred in 1935?

I would not point to any development of 1935 which is particularly outstanding. Probably most attention has been paid to long-span farm lines, but these were well developed before. Some new equipment has appeared, but none can be called outstanding as yet.—H. P. SEELYE.

Distribution transformers with built-in lightning arresters and protection and the single terminal transformer

developed for inexpensive rural lines. Small step regulators. Inclosed metering. Sodium-vapor highway lighting. —M. T. CRAWFORD.

2. What developments in equipment or practice are most needed in distribution (a) to reduce costs, (b) to improve performance?

While improvements in detail are always to be desired, I cannot point to any major developments which are to be particularly sought. I would say that the thing most needed is for the operating companies to put into general practice the improvements and economies which have already been worked out by some of the industry.—H. P. SEELYE.

(a) Standardization of materials and practices and reduction of number of types of equipment manufactured. Standards should be agreed upon by all companies rather than separate standards for each. (b) Improvements in transformers, pole line oil circuit breakers and equipment for increased ruggedness and integrity of insulation. Too many blow-ups.—M. T. CRAWFORD.

3. What new ideas or equipment promise to reduce costs or improve performance in distribution substations?

The use of relatively small substations with tap-changing voltage regulating equipment seems to offer promise of some economy, but it is still uncertain as to what the magnitude of this will be except in certain specific cases which have been studied.—H. P. SEELYE.

Inclosed unit type substations in medium sizes for outdoor installations and use of primary networks.—M. T. CRAWFORD.

4. In what aspects of distribution will the increased loads result in rebuilding, added equipment or new construction in the coming months?

This is impossible to answer in a general way. For a system which has been carefully designed with a flexibility to allow for load growth, an increase in present loads should require mostly only additional transformer capacity. Extensions for new loads will, of course, be made with new construction of the latest design. Of course where a system is inadequate for expansion the situation will be quite different and considerable rebuilding may be necessary.—H. P. SEELYE.

Increased loads will require some rebuilding for higher voltages, additional transformers in substations and on lines, followed later by trunk transmission and principal substation enlargements. Additional underground networks construction will follow commercial building construction.—M. T. CRAWFORD.

Opinions on Transmission

Advances in transmission have been quite noticeable despite a restriction in line building. Two or three notable high-voltage lines and many new products are recorded.

1. What outstanding developments in the art and practice occurred in 1935?

The development of high-speed, high-voltage oil circuit breakers and of high-speed relays to make the high-speed breakers effective. The advance in the design and application of devices for lightning protection. The final designs for 287-kv. transmission. —J. P. JOLLYMAN.

The 287-kv. transmission line. Development of high-speed switches clearing in 3 cycles. Installation of extension counterpoises on high-voltage transmission lines. Extension of carrier-current protective schemes. High-speed relaying.—N. B. HINSON.

In my opinion there were no truly outstanding developments in the art of transmission in 1935.—P. H. CHASE.

One-cycle carrier-current relaying, continued development of expulsion gaps.—PHILIP SPORN.

There were no outstanding developments in 1935.—J. H. FOOTE.

2. What developments in equipment or practice are most needed to (a) reduce costs, (b) improve performance?

(a) Full utilization of the strength of materials actually used, avoiding excessive factors of safety. (b) The application of higher speed switching and improved lightning protection.—J. P. JOLLYMAN.

(a) Single-circuit lines to load centers rather than into the transmission network, these lines to meet the requirements of (b). (b) Improved performance of single-circuit transmission lines so that second circuits will not be needed for service requirements.—N. B. HINSON.

There seems to be no large opportunity for reducing costs in overhead transmission line construction, until the performance of individual lines can be brought to the stage where it permits the installation of fewer lines for the same or better service continuity. Therefore, the attainment of appreciably lower over-all transmission costs is most likely to hinge on the practicability of obtaining adequate individual line performance, without having to spend excessive sums for the improvement.—P. H. CHASE.

(a) Simplification and standardization of transformer and switching equipment. (b) Perfection of lightning arrester devices.—PHILIP SPORN.

(a) Reduce costs by making each element in the transmission chain of consistent strength and reliability and to avoid expenditures for items which do not earn their keep, also to make the design such as to be easily and systematically constructed in the field.

(b) Improve the performance through the consistent use of a definite minimum of length of wood insulation and a definite minimum of striking distance to ground conductors as well as the consistent use of lightning arresters in connection with apparatus installations.—J. H. FOOTE.

3. What types of lines and in what voltage ranges do you believe transmission line building will be active in the coming year?

Extension of transmission lines, 66 to 220 kv. inclusive; the construction of super-power lines does not seem to be probable during the next few years. —J. P. JOLLYMAN.

The 230-kv. steel tower line with intermediate voltage down to 110 kv. sub-transmission lines on wood poles. —N. B. HINSON.

The question as to types and voltages of lines in which construction will be active during the coming year or two is particularly difficult to answer. I believe, however, that the majority of this construction will continue to be in the lower voltage brackets, say 66 kv. and below.—P. H. CHASE.

Rural lines.—PHILIP SPORN.

Wood pole transmission lines ranging in voltage from 23 kv. to 46 kv. will be most actively constructed or reconstructed in the coming year, but of course the major mileage will be in low voltage rural lines with single phase 4,800 volt to ground predominating.

We believe that all companies can very profitably review the designs and types of construction of older lines to see what improvements, particularly with regard to the use of wood insulation and long spans, can be incorporated in the rebuilding of transmission lines necessitated by age.—J. H. FOOTE.

ELECTRICAL WORLD

L. W. W. MORROW · EDITOR

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Utilities Should Take the Initiative

OUT of the dismaying experiences of the past few years come glimpses of the final answer to the public utility political problem. We are convinced that this will be private enterprise with government regulation, wherein the industry and regulatory authorities will reach an equitable division of work and responsibility.

Utilities by their position and by the conduct of some of their members were singled out as the "bad boy" of industry by new dealers. The sins of the few were visited upon the many. Nor did the many sense the importance of the battle or they would have acted promptly by suggesting immediately changes and plans such as those recently reported by Mr. Willkie. There were new conditions to be met and faced. There were readjustments to be made. There were new programs to be announced. But the utility industry was unorganized and somewhat inert for many months and political extremists and theorists had their way with destructive legislation and propaganda.

But conditions have changed. The industry is awake and in action. It is cleaning house within and building without. Recourse to the courts was a necessity to prevent destruction, but parallel with this action is a rebuilding program that has proceeded rapidly. Holding companies have reorganized, simplified their structures and improved their operations. Weak and disreputable members of the industry are known and are on their way out. Operating properties have enhanced their good names as well as their service. It becomes clear that the things the industry has done to improve itself were needed and were constructive. It becomes equally clear that most of the things the government has done were uneconomic, unnecessary and destructive.

In the light of these experiences it is to be hoped that the utilities and Congress will get together to their mutual advantage. Destructive legislation should be modified, the new utility policies and organizations should be recognized and fair, no matter how severe, regulation can be accepted and will be accepted instead of the pernicious type now the law. Utilities welcome and advocate strong and fair regulation. They are just as eager as the government to electrify farms, lower rates and extend electrification in this country. They have always been advocates of these policies and they are now prepared to carry them out. There is no real difference of opinion between the public and the utilities. There has been a depression misunderstanding and a depression action that were unnecessary. Sane counsel should now prevail and intelligent action should be taken to rectify past mistakes and to get on the constructive path.

We believe this will be possible and that the first step will be for utility leaders to present a plan and a program, such as that outlined by Mr. Willkie recently, whereby sound regulation will be embodied with sound utility management and initiative to advance the status of electrification in this country. These go hand in hand. They can be sold to Congress. Now is the time for preparatory action.

Re-establish Local and Regional Co-operative Work

IT HAS become increasingly apparent that the complete dissolution of the old N.E.L.A. was unnecessary and unwise. The committee work and the decentralized organization to make possible regional meetings to discuss operating, engineering and commercial problems were good things to maintain. They have not been replaced and they are badly needed.

Especially important is a re-establishment of a mechanism whereby the executives, engineers, commercial men and accountants can get together in a state or region to discuss their problems and to develop co-operative action. Likewise, local, regional and national committees should be active and tied together to work out the current operating problems of the industry. None of this work deals with political relations. It is the bread-and-butter activity that makes alert and competent executives and employees.

Action to get these results should be started where needed and where the interest is keen and not ordered from the top. There is nothing to stop this revival of needed activity, and in fact E.E.I. executives would support and encourage it. The initiative must be taken locally, however. We believe the re-establishment of regional meetings and of committees on somewhat the old N.E.L.A. basis is better than an endeavor to make separate national and local organizations of commer-

cial, engineering and accounting men. There is an interlinking and a mutuality of interest that is best handled in the way that experience shows achieved splendid results. This movement toward co-operative work on mutual problems would energize and vitalize the industry in this time of expansion.

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What Is Surplus Power?

BANGOR HYDRO-ELECTRIC sells energy at sub-penny rates to mill customers in certain cases from adjacent generating plants whose outputs are fully absorbed by these factories. The question came up in a recent rate case whether such energy can properly be classed as secondary power in view of the company's contract provisions allowing for interruption or curtailment of service. The Maine commission concluded that such energy is prime power and that the low rates at which it is sold should not be allowed to burden other consumers if sold below cost. The implications are that something beyond price must be considered in classifying energy as prime or secondary, and that the existence of low-priced energy does not, *per se*, prove that it is of the "dump" variety.

Such situations invite study, all the more because of the trend toward future plant construction in close proximity to bulk load centers. Absence of transmission line facilities between generator and load, where such locations are economic, is a gain to the entire system; *i.e.*, it contributes toward lower over-all cost of supply, and so may benefit other classes of users. Surplus power is capacity which would be wasted if not sold favorably and without imperiling reserve requirements, to cite one definition. The Bangor case is interesting because it emphasizes the importance of sharpness of focus in defining power classifications when analyzing costs and burdens on different groups of utility customers.

Why We Present This Issue

THIS industry, beyond all others, is an open book for all to read. This is our major reaction to the data and opinions published in this issue. There is nothing hidden about the electrical business, although it is enormous and ramified. Each item of cost, of revenue and of investment is given in complete detail. Frank and honest expression is given to future plans for action.

An issue such as this is a big undertaking. It was planned several months ago. Questionnaires were prepared and launched at the right time. Wired requests were sent to get late data. N.E.M.A. and E.E.I. headquarters were consulted and co-operated fully in developing information. Many long hours of labor by men of the industry and by the editors lie behind the summary data presented.

More than five thousand questionnaires were answered by utilities and manufacturers to give individual data on rural lines, on budgets, on power station construction, on sales of products, on operating expenses. The editors then spent weeks compiling and checking the data to give the totals presented. Other weeks were spent on the analysis of balance sheets of individual companies, in addition to making critical studies to learn what financial data would be significant and valuable. The mass of information and material to support the data published affords a voluminous and detailed book of information about the electrical industry and its individual enterprises.

We are glad to do this work. We are proud of the position of ELECTRICAL WORLD in the industry, whereby it has the confidence of the industry and it is able to secure the co-operative work of thousands of industry men to make possible the results presented. We can plan, but without the confidence and help of the industry we could not present this issue. Our most sincere thanks is given to all who contributed to it.

BUT the main point we wish to make is that the purpose of these data is to help the industry. Guides for internal operations and suggestions for overcoming industry problems are here. Those outside the industry, whether banker, politician, journalist, stockholder or customer, can find the truth about the industry in these pages. We have done our best to summarize, to simplify and to dramatize these facts so that they may be grasped and understood. We hope this open book of the electrical industry will be read and used.

The salvation of this industry lies in its continued development on a factual and fully co-operative basis that is illustrated by the information in this issue, and, in addition, a recognition by the public that it is an honest and progressive industry. We know that it is so large and so technical that the average citizen cannot and will not study its operations completely. But the time is past when lies told the average citizen by enemies of the industry should pass unchallenged. Those within and without the industry should attack these accusers and refute their lies with the facts so freely and abundantly available. This industry has every reason to be proud of its work and its policies. It should be on the offensive against its enemies. It has the facts to act upon.

NEWS OF THE WEEK

Willkie urges the Administration to stop "hating" . . . Niagara Hudson plans to absorb ten more of its affiliates . . . James H. McGraw retires . . . Lilienthal defines T.V.A. "yardstick" . . . Rural "spite" lines arouse criticism . . . R.E.A. finds spending is a tough job

Utility Compromise Asked of Washington

Willkie urges Administration to stop its "hating" and pass "reasonable" law which will make possible utility expansion and speed heavy industries

An end to "hating" between the utilities and Washington and the enactment of a "reasonable" rather than a "destructive" federal public utility law were urged by Wendell L. Willkie, president of Commonwealth & Southern Corporation, in a speech which was called by the New York *Times* a "challenge to federal statesmanship."

Mr. Willkie's appeal, made before the Bond Club of New York, went on to outline the fillip the heavy industries would draw from restoration of confidence. "Tens of thousands of men in the heavy goods industries are praying for employment and economic freedom," he said. "Tens of thousands of men can be put to work in utility construction if sanity will but prevail."

The speaker revealed that two efforts at compromise had been made by the industry before and during the fight to enact the Wheeler-Rayburn bill, but told how both were rejected by the "final authority." Typical of press reaction to Mr. Willkie's speech was the New York *Times*' comment that both compromises "seemed sensible" and that "the only man who can invoke reason and call off the dogs of war is the President."

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Senator Norris Plans Mississippi Authority

Electrification of most of the country's farms even if federal subsidy is required, Senator George W. Norris' pet program, appears likely to be placed before the present Congress with the Nebraskan hard at work drafting a Mississippi Valley Authority bill. This ambitious program, which would embrace about half the nation, follows the T.V.A. pattern.

Flood control would be the primary aim of the project but navigation, irrigation, hydro-electric power, reforestation and soil conservation also are listed. The proposal follows closely upon the correspondence between Senator Norris and R.E.A.'s chief, Morris L. Cooke.

Niagara Hudson Acts to Absorb Ten Units

Asks approval of plan to consolidate more of its subsidiaries as tendency toward integration of holding company properties again gains momentum

The trend toward widespread consolidation and integration of utility holding company subsidiaries has resumed during the last few weeks, among the more important recent developments being the announcement by Niagara Hudson Power Corporation of another far reaching step in the simplification of its corporate structure by absorption of ten operating companies. Nine are subsidiaries.

The ten companies affected are Antwerp Light & Power, Fulton Fuel & Light, Fulton Light, Heat & Power, Malone Light & Power, Northern New York Utilities, Inc., Old Forge Electric, Peoples Gas & Electric of Oswego, St. Lawrence County Utilities, Inc., St. Lawrence Valley Power and the Norwood Electric Light & Power.

Late last week the New York joint legislative investigating committee heard

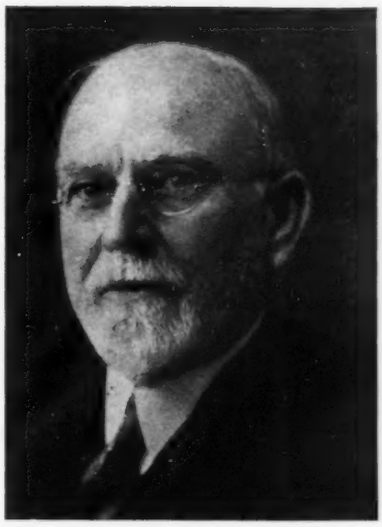
James H. McGraw, Jr., Becomes Chairman

James H. McGraw, Jr.

At a meeting of the board of directors of the McGraw-Hill Publishing Company, Inc., held on December 27, 1935, James H. McGraw, the founder of the company and its head for more than fifty years, resigned as chairman of the board and was elected honorary chairman. He will remain as a member of the board.

James H. McGraw, Jr., who has been connected with the company for the past twenty years, was elected chairman of the board. He has served as treasurer and was executive vice-president and vice-chairman of the board at the time of his election.

Malcolm Muir, president of the company since 1928, continues in that capacity.



James H. McGraw

charges of write-ups, milking of operating company earnings and $950,000 personal profit to Floyd L. Carlisle, head of the Niagara Hudson system, in the Oswego River Power Corporation, dissolved since the passage of the Public Utility Act of 1935.

Two mergers have been approved by the Federal Power Commission. One was consolidation of West Florida Power Company and Ocklawaha Power Company with Florida Power Corporation. Florida Power is an Associated Gas affiliate. The other was purchase of Toccoa Electric Power Company by the Tennessee Electric Power Company. Tennessee Electric, a Commonwealth & Southern affiliate, now operates Toccoa.

The Texas Utilities Company has applied to the F.P.C. for approval of its acquisition of the New Mexico Utilities Company. Both are subsidiaries of Community Power & Light Company.

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Ontario Hydro Signs New Power Contracts

The bitter controversy over cancellation of Ontario Hydro-Electric Commission contracts "neared its end" with the signing of new contracts with Gatineau Power Company and MacLaren-Quebec Power Company, in the view of the pro-Hepburn press, despite a renewed storm of protest from the Premier's opponents. One of the sharpest criticisms came from the *Financial Post*, Toronto, which questioned whether insiders in the cancellation were not, at several stages, in a position to make a market "killing" in securities of the five private companies affected. The *Financial Post* also declared the saving would be nearer $6,000,000 annually than the $9,000,000 claimed.

Under the new contract, Gatineau reserves for the commission 260,000 hp. at $1.75 per horsepower, while Hydro will take immediately 100,000 hp. at $12.50 per horsepower. MacLaren reserves 60,000 hp. at $1.75, while 40,000 will be taken at once by the commission at $12.50.

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Bay State and New York Pass Buck to F.P.C.

Massachusetts and New York followed the Connecticut Public Utility Commission in turning a more or less deaf ear to the suggestion of the Federal Power Commission that they consider steps to force resumption of interconnection of power lines between the three states, cut to avoid interstate classification under the Public Utility Act of 1935. The Connecticut commission said it saw no necessity for such action (ELECTRICAL WORLD, December 21, page 45), the Massachusetts regulatory body shortly afterward declared that there is no law giving it authority to require the resumption, and New York told F.P.C. Chairman Frank R. McNinch that it is continuing its investigation, but believes the matter is largely up to the two other states.

Read the News Weekly

The biweekly News Edition of ELECTRICAL WORLD makes its appearance January 11. This news supplement, which will go to all ELECTRICAL WORLD subscribers free of charge on the intervening Saturdays between the regular issues, will make available last-minute developments in the national capital through ELECTRICAL WORLD's Washington bureau and will present all electrical industry news gleaned by an enlarged staff of correspondents in leading cities throughout the country. This augmented and weekly news service reflects the efforts of the editorial staff to improve service to readers.

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City Power Contract Arouses Controversy

Sharp controversy was precipitated in Chicopee, Mass., last week when the local electric commission transferred the city's lighting contract to the Holyoke Water Power Company for fifteen years, effective next August 1. Turners Falls Power & Electric Company, in an effort to retain the business, was revealed as having made an eleventh hour promise to meet the Holyoke company's bid of 1.175 cents per kilowatt-hour for the first 200 kw.-hr. and 1 cent thereafter.

Mayor Oneil Deroy and two commissioners approved the new contract but Mayor-elect Anthony J. Stonina revealed that several prominent citizens had approached him on behalf of the Turners Falls company. Prominent business men held that Chicopee should not take the contract (payments were $193,000 to Turners Falls in 1934) from a company with $3,000,000 worth of property in the city and paying $140,000 annual taxes.

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Power Plant Expands

The Stevenson hydro-electric station of the Connecticut Light & Power Company on the Housatonic River will shortly be equipped with a fourth generating unit, rated at 8,200 kw., and rounding out the design of an installation which first began service in 1919. Three units aggregating 23,400 kva. comprise the initial layout. The new machine is of the vertical type and will consist of an 11,000-hp. S. Morgan Smith waterwheel direct connected to a Westinghouse generator, the operating head being 68 ft. Penstock, draft tube, foundations and hydraulic structures were provided for this new unit when the plant was built.

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F.P.C. Asks Rate Data on Interstate Sales

The first order which may force public utilities to take a definite stand with regard to Title II of the Public Utility Act of 1935 was taken by the Federal Power Commission last week while the government pressed in the courts to confine the test of Title I (which includes the so-called death sentence) to its suit against Electric Bond & Share. Typical of the latter efforts was the brief in District of Columbia Supreme Court asking a stay of action in the attacks by seven companies on the act pending there, contending the "Bond & Share case will raise and settle all the fundamental questions which can be raised."

The F.P.C.'s first order (this agency derives its power entirely from Title II which its chairman, Frank R. McNinch, declares was not ruled upon in the Baltimore decision) requires all companies owning facilities for the sale of electric energy in interstate commerce to file a schedule of rates. The action was announced as the "first step" in controlling rates in interstate commerce and no important utility has indicated what its policy will be as to compliance. The data is to be filed on January 15 and the fifteenth of each month thereafter.

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Highway Lights Tested

Proof that adequate highway lighting reduces automobile accidents will be offered by the Virginia Electric & Power Company, which is installing an experimental lighting system for about a mile on the Richmond-Petersburg turnpike. Erection of the poles, at the company's expense, was approved by the state Highway Department.

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Iowa Law Upheld

The Iowa Legislaure's right to enact a law sustaining a municipality's contract to build its own power plant was upheld by the state Supreme Court in the suit of the Iowa Electric Light & Power Company against Grand Junction, Iowa. The town contracted with Fairbanks, Morse & Company in 1934, but the utility obtained an injunction before the law was passed on the ground that bidding was not competitive.

Spending No Cinch, R.E.A. Discovers

Finding self-liquidating projects in marginal fields proves tough job but agency expects sharp increase in loan approvals in the immediate future

Spending money—even New Deal relief money—isn't the easy job it's supposed to be, particularly when it must be spent on self-liquidating projects in a marginal field.

Such, at least, is the conclusion reached by Morris L. Cooke's Rural Electrification Administration which, after six months of intensive effort, has released only $3,000,000 in seventeen loans to finance 2,732 miles of electric line serving 10,538 customers in rural sections compared with the $100,000,000 available ever since last spring. But there have been difficulties and R.E.A., by no means ashamed of its record, expects to step out in the immediate future.

Much of R.E.A.'s grief has been due to two limitations: first, that pregnant word "self-liquidating"; second, the statutory requirement that municipal and farm co-operative organizations must be given precedence over established privately-owned utilities. The latter made it impossible to accept a blanket program submitted by the utility companies. Municipal plants have not been overly anxious to extend their facilities into thinner territory.

R.E.A.'s principal field of operations has been, and is, among the farm co-operatives. Now it is no secret that the record of such organizations has not been one of unqualified success. The farmers themselves have entered into the game with great zest, and have flooded Mr. Cooke's office with applications for government funds. But examination of their proposals has disclosed so many technical and economic blind spots that R.E.A. has had to make haste very slowly in accepting them, particularly as the almost invariable security offered for the loan is the electric line itself, if and when built.

Other rural electrification developments in widely separated areas include the following:

ALABAMA—Alabama Power Company opens 41-mile line serving 171 farms in Dallas County and 15.2-mile line serving 55 customers in Princeton County.

GEORGIA—Five villages in Greene and Oglethorpe counties organize to seek rural lines, either from Georgia Power or R.E.A. Rayle Electric Association seeks charter for 11-mile line and plans to ask R.E.A. loan.

ILLINOIS—Commerce Commission authorizes Central Illinois Public Service to extend lines in Macoupin County; Public Service of Northern Illinois to serve numerous townships in nine counties, and Peoples Power Company to extend lines in Rock Island County.

IOWA—Railroad commissioners allow extensions, totaling about 20 miles, by Iowa Electric Light & Power, Iowa Public Service, Iowa Electric and Central States Electric. Town of Sumner plans to ask R.E.A. loan for 75 miles of line to draw energy from its present plant.

MICHIGAN—Utilities commission orders Detroit Edison to supply rural service in its territory wherever there are five customers per mile. Consumers Power plans $2,000,000 for 1936 line construction.

NEBRASKA—State's twelfth rural project plans to ask $400,000 R.E.A. loan to serve 1,500 farms in Burt County. Headquarters is in Tekamah and C. A. Sorensen is counsel.

NEW YORK—Commission approves reduced minimum charges for extension of rural lines by Associated Gas companies, affecting 30 counties. Rockland Light revises plan for lines in Rockland, Orange and Sullivan counties.

OHIO—Champaign County co-operative plans to increase loan asked of R.E.A. to $500,000 from $412,000, Forrest Critzer, co-operative leader, announces.

OREGON—Three "people's utility districts" seek state approval. One covers Linn County, a second Marion County, including Salem, the state capital, and the third and largest parts of Clackamas, Clatsop, Columbia, Lincoln, Polk, Washington and Yamhill counties.

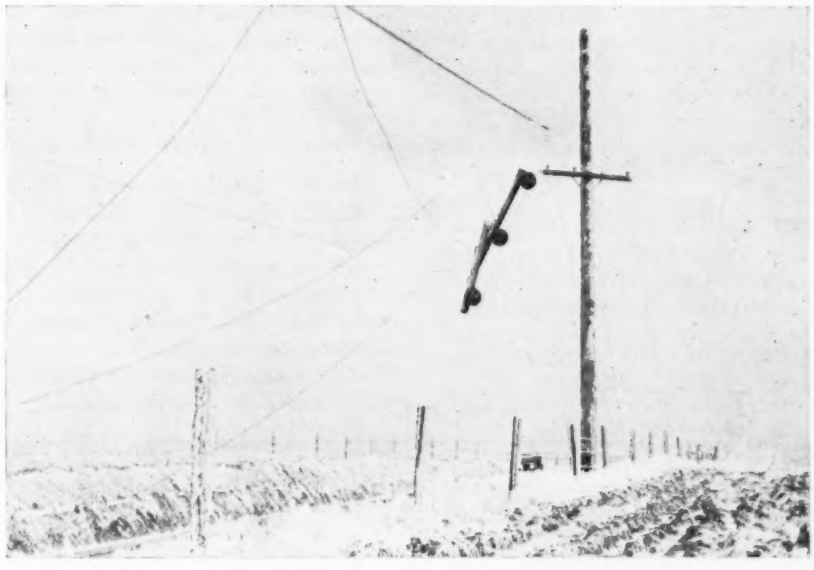
T.V.A., R.E.A. Decry Rural "Spite" Lines

Say utility companies incur ill-will by jumping in and taking more profitable territories, thereby blocking extension of service in sparsely settled areas

Complaints that local power companies are crippling many farm co-operative electrification projects by rushing the construction of "spite" lines that tie in the more profitable customers, thus rendering the remainder of the co-operative project economically unfeasible, are being received from many quarters by both the Rural Electrification Administration and the Tennessee Valley Authority. Tennessee and Ohio, where rural co-operatives are particularly active, seem to be the principal complaining areas, although scattered reports are being received from other sections of the country.

The Ohio Farm Bureau, which is actively aiding rural co-operatives (sixty counties have organizations working on plans) has found it advisable to include in its instructions to local organizers the suggestion that all prospective customers be induced to sign an agreement not to negotiate individually for power service or right-of-way easements, but to place such negotiations in the hands of its executive leaders. These leaders, it warns, will be placed "on the spot" in an attempt to kill their support, and will need "the moral support and con-

FOG TOO THICK FOR KNIFE TO CUT



It wasn't a sleet storm that tore down 21 of Washington Water Power's 300-ft. spans of line in a recent cold snap; it was fog moving up the Columbia River gorge near Davenport, Wash., where it met freezing winds sweeping down from the mountains to the east. Ice formed to several times the normal diameters of the 60,000-volt transmission cables, four pounds to the foot; fences became ice barriers and the roads, reduced to skating rinks, were a problem for the repairmen.

fidence of their neighbors . . . in order to withstand this pressure."

David E. Lilienthal, T.V.A. director, has written a letter to a Bedford County (Tennessee) co-operative official in which he pledges T.V.A.'s continued support to farmers' organizations despite "certain hastily undertaken activities of a small number of private power companies" which have hitherto "taken little or no interest in these unserved rural areas." He then cites the experience of Rhea County, Tenn., where the city of Dayton, in response to rural requests for power, has applied for and received a R.E.A. loan for $38,058 to extend its service into surrounding territory. After the loan was announced, but before the money was actually available, Mr. Lilienthal charges that crews of the Tennessee Electric Power Company began line construction along routes previously surveyed for the municipal extension.

Federal authorities contend that local resentment has been aroused by the private companies' attitude, citing newspaper attacks, and argue that the holding companies are weakening their position to ward off severe federal regulatory legislation.

One of the attacks on private utility policy comes from the state of Washington, where the state Grange charges the four major companies operating in the state are ham-stringing rural electrification by maintaining excessive wholesale rates. The complaint is directed to the Public Service Department, which is required by law to act on all such charges.

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Western United Dissolves

Simultaneously with the vote of stockholders to dissolve Western United Corporation, a holding company, and to exchange its securities for those of its principal subsidiary, Western United Gas & Electric Company, two affiliates of former Insull companies, asked the S.E.C. for permission to acquire about 200,000 shares of Western United Gas & Electric common stock. Public Service Subsidiary Company, affiliated with Public Service of Northern Illinois, seeks 66,666 2/3 shares and Commonwealth Subsidiary Company, affiliate of Commonwealth Edison, 133,000.

COMING MEETINGS

American Engineering Council—Annual meeting, Washington, D. C., January 9-11. Frederick M. Feiker, executive secretary, 744 Jackson Place, Washington, D. C.

Canadian Electrical Association — Midwinter conference, Montreal, Que., January 23-24. B. C. Fairchild, secretary, 409 Power Building, Montreal, Que.

American Institute of Electrical Engineers—Winter convention, New York, N. Y., January 28-31. H. H. Henline, national secretary. 33 West 39th Street, New York, N. Y.

National Electrical Manufacturers Association—Midwinter meeting, Waldorf-Astoria Hotel, New York, February 3-8. W. J. Donald, managing director, 155 East 44th St., New York.

Electrochemical Society — Spring meeting, Cincinnati, Ohio, April 23-25. Colin G. Fink, secretary, Columbia University, New York, N. Y.

Missouri Association of Public Utilities—Annual meeting, St. Louis, Mo., April 29-May 1. Jesse Blythe, assistant secretary, Merchants Bank Bldg., 101 West High St., Jefferson City, Mo.

Discounts in Seattle Arouse Commission

Special discounts approximating $1,000,000 a year are allowed customers in Seattle by the Puget Sound Power & Light Company and the city Light Department, the Washington Department of Public Works contends in an attack on the private company's rates and a protest to the municipal plant over which the state body has no control. Discounts run as high as 40 plus 10 per cent, the commission charges, in giving warning that it contemplates action against Puget Sound Power,

The complaint charges abuses such as apartment house tenants being charged in full while the landlord receives large discounts.

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Committee Appointed

Appointments by the National Association of Railroad and Utilities Commissioners to the public utility committee of statistics and accounts include E. W. Morehouse (Wis.), chairman; B. F. Morgal (Pa.), F. A. Duchell (Conn.), A. E. Lamb (Maine), Paul Weiland (Ohio), W. V. King (F.P.C.), Fred Kleinman (Ill.) and J. L. Rogers (I.C.C.).

Boston Edison Adopts Outdoor Metering

Outdoor metering with socket type installation has been standardized by the Boston Edison Company, effective January 1, 1936, applying to single-phase a.c. service for estimated demands up to and including 100 amp. The company issues about 440,000 bills per month for residential service and anticipates that many advantages will result from the change. In summer about 80,000 skipped readings per month are reported and about half this number normally, due to absence of customers from their premises. Besides reductions in this direction, savings in time in reading, testing and installation will be gained, as well as greater convenience in renewing services after places have been closed. Diversion of energy should also be substantially reduced.

So far as practicable, meters will be mounted outdoors with the service switch inside the building, and when indoor meter mounting is necessary connection of the switch will be beyond the meter when permitted by the local authorities. Meter sockets will be furnished by the company, the conduit and trough types being supplied. When the number of meters exceeds four they will be installed indoors, beyond an accessible fuse type service switch. When installed adjacent to the meter trough the service switch design specified by the company requires that the cover be interlocked with the trough in a way which prevents opening the cover without removing the first meter. Provision is made for three-wire services to ranges, etc., with outside metering.

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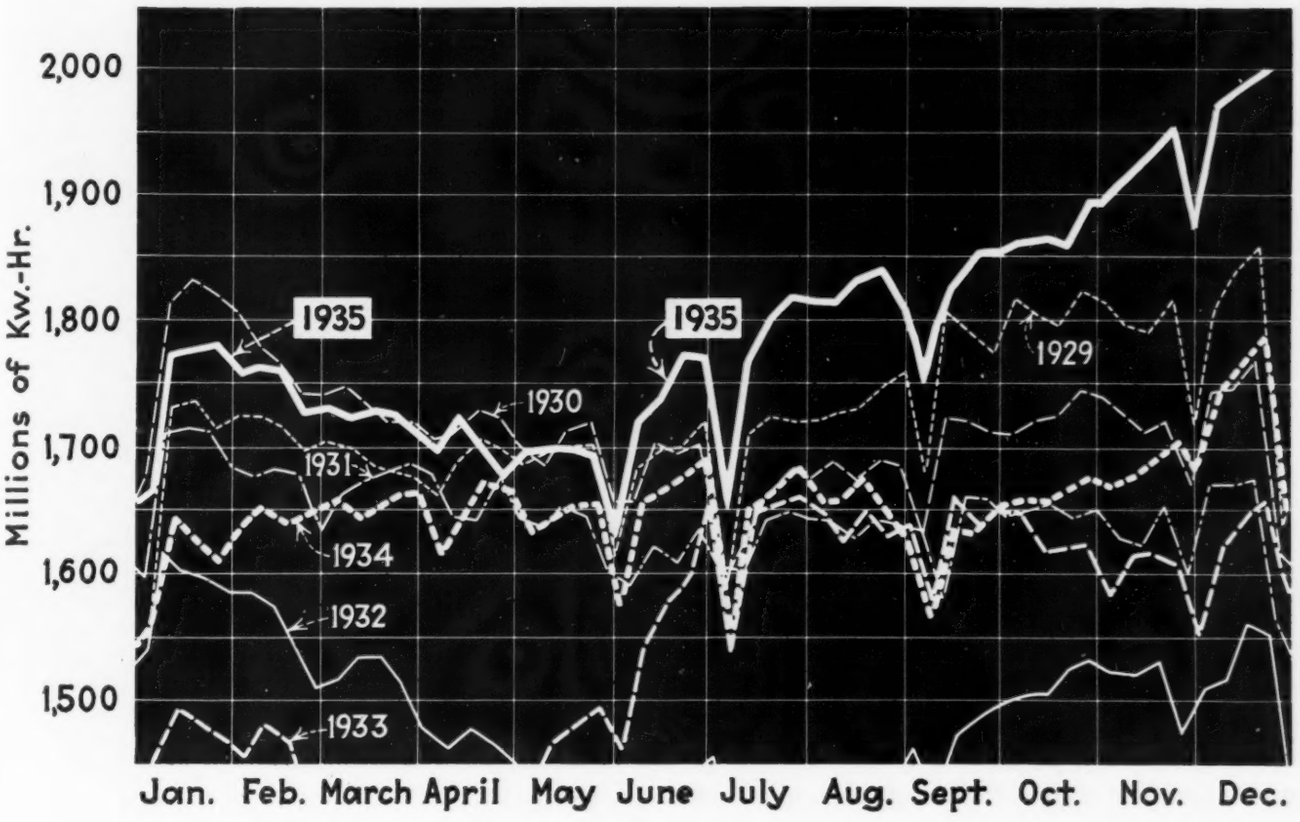
Plan Power Meeting

Work of drafting a program for the Sixth Midwest Power Engineering Conference in Chicago April 20-24, inclusive, has been delegated to F. D. Chase, president; J. R. Van Pelt, chairman; O. A. Anderson, Frank Innes, J. E. Kearns, G. E. Pfisterer and K. A. Auty. G. E. Pfisterer, secretary, announces that special sessions already planned cover specialized activities such as prime movers, refrigerating, electrical transmission and application, ventilating and coal utilization.

Details of New R.E.A. Projects Approved

	Miles of Line	Farms Served	Amount	Source of Power	Rate	Territory, Counties
Southeastern Nebraska Public Power District	450.0	1,117	$440,000	.....	$5.90	Gage, Neb.
Northern Idaho Rural Elec-Rehabilitation Ass'n, Inc., of Naples, Idaho	35.0	72	35,750	Private	6.60	Bonner and Boundary
Northern Idaho Rural Elec-Rehabilitation Ass'n, Inc., of Naples, Idaho	40.0	248	54,000	Private	6.60	Bonner and Boundary
Kentucky Rural Electrification Company, Louisville	38.7	360	71,700	Private	5.50	Fleming, Lee and Owsley
Earl W. Baker Utilities Company, Bethany, Okla.	30.0	155	30,000	Private	5.60	Oklahoma and Canadian
Suburban Electric Corporation, Dunlap, Ill.	98.0	300	81,500	Private	.....	Knox, Peoria and Stark

Output Overshoots 2,000,000,000 Kw.-Hr.



Records were broken when central station energy output rose to a new peak for the week before Christmas. As reported by the Edison Electric Institute it amounted to 2,002,005,000 kw.-hr. This surpassed the corresponding figure for 1934 by 12 per cent and for 1929 (previous winter peak) by 7.5 per cent. It marks the high point, thus far, of an exceptionally steady and relatively steep rise that has been in progress since the beginning of June, interrupted only by the usual dips due to holidays.

In no other one of the seven years for which these weekly statistics are available has there been any such consistent progress. In May production was close to that of the best previous year and was about 1,700,000,000 kw.-hr. a week. Now this has been exceeded by 300,000,000 kw.-hr. The nearest approach to this was 185,000,000 kw.-hr. in 1933, the year of the great June expansion, deflated in autumn. The increase in 1929 was only 160,000,000 kw.-hr.

A drop of 1,847,264,000 kw.-hr. left the final week 11.9 per cent above 1934, 12.8 per cent above 1929.

Weekly Output, Millions of Kw.-Hr.

1935	1934	1933
Dec. 21...2,002	Dec. 22...1,788	Dec. 23...1,657
Dec. 14...1,983	Dec. 15...1,767	Dec. 16...1,644
Dec. 7...1,970	Dec. 8...1,743	Dec. 9...1,619
Nov. 30...1,877	Dec. 1...1,684	Dec. 2...1,554
Nov. 23...1,953	Nov. 24...1,705	Nov. 25...1,608
Nov. 16...1,939	Nov. 17...1,691	Nov. 18...1,617

Per Cent Change from Previous Year

Region	Week ended Dec. 21	Dec. 14	Dec. 7
New England.....	+ 9.3	+10.0	+11.9
Middle Atlantic.....	+ 8.8	+ 7.9	+10.5
Central Industrial...	+14.2	+14.8	+17.9
West Central.....	+ 9.4	+10.5	+11.8
Southern States.....	+11.3	+14.2	+10.6
Rocky Mountain.....	+17.5	+16.2	+17.1
Pacific Coast.....	+14.1	+12.1	+12.5
United States.....	+12.0	+12.2	+13.0

Utility Seeks to Sell $27,000,000 Bonds

The first effort to ascertain the Securities and Exchange Commission's attitude toward allowing sale of bonds by a subsidiary of a utility not complying with the registration feature of the Public Utility Act of 1935 came last week when West Penn Power Company of Pittsburgh filed for registration $27,000,000 of 3½ per cent mortgage bonds, series I. The company and its subsidiaries asked exemption under the act, while the parent company, American Water Works, is among the big systems contesting constitutionality.

December's only large utility financing, due to uncertainty as to the status of new issues, was Southwestern Gas & Electric Company's $16,000,000 first mortgage 4s, priced at 99½, and $4,500,000 of 4 per cent serial debentures, due 1936-40, and sold at prices ranging from 92.20 to 101.85. The company, a Middle West Corporation subsidiary, registered and these two issues were the first "declared" under the act.

•

Winnipeg Plan Voted

The final step in Winnipeg Electric Company's move to take over all its subsidiaries and consolidate the funded debt so as to reduce fixed charges was taken last week when its common-stock holders approved the plan.

Mid-West Service Unit Approved by S.E.C.

Another clew to the Securities and Exchange Commission's public utility policy was given last week when the federal agency allowed the Middle West Corporation to absorb its service organization, extend the latter a $75,000 loan and set up charges at 0.7 per cent of the gross of each subsidiary for its services. Utility leaders had doubted that the S.E.C. would countenance such a fee system under the terms of the law.

Middle West is successor to Middle West Utilities Company through reorganization and is one of the few large top holding companies to register under the Public Utility Act of 1935.

T.V.A. "Yardstick" Not Wholesale Rate

Lilienthal declares all generating costs are much the same, but that price to consumer must be cut — Says lower rates quickly bring higher revenues

Just what T.V.A. means by its "yardstick"—and the cost of generating energy has little to do with it—was explained by Director David E. Lilienthal in a speech this week in which he asserted that wholesale rates make up "a very small part of the total cost to the consumer." Mr. Lilienthal declared further that T.V.A. wholesale rates are little different from those of private companies in its territory and that the "yardstick," therefore, applies solely to the ultimate cost to the consumer.

He flatly denied the theory that rates can't be cut until costs are pared or consumption increased, citing the experience of several private companies in the Tennessee area to support his contention that sharply reduced rates will very quickly mean substantial gains in gross revenues.

The Tennessee Valley Authority was declared constitutional in Memphis federal District Court just after final arguments had been presented to the United States Supreme Court in the Alabama case, the validity ruling coming in connection with the trial of two men who were found guilty of selling "T.V.A. units" in western Tennessee. The pair, J. E. Pierce and E. H. Roach, were charged with impersonating federal officers while it was alleged the buyers thought they were subscribing for T.V.A. stock, whereas they were signing up for advertising space.

The constitutionality ruling of Judge John D. Martin stressed the government's right to dispose of its own property as Congress may determine and contested the right of the courts to intervene.

Meanwhile Director Lilienthal reported record power production at the government's Wilson Dam in the second half of 1935 with energy generated and used valued at approximately $600,000 for the five and one-half months to mid-December.

•

Kentucky Commission Ousted

Governor Chandler of Kentucky ousted all three members of the state Public Service Commission last month when they were in the midst of a hearing in their investigation of rates charged by the Southern Bell Telephone & Telegraph Company. The hearing was suspended pending appointment of a new commission. The Governor has named J. C. W. Beckham of Louisville as the new chairman. Mr. Beckham is the third chairman the commission has had since it was established by the 1934 General Assembly. The ousted commissioners charge the Governor failed to present cause for their dismissal as prescribed by state law.

•

Dayton Power Starts $3,000,000 Expansion

Installation of a giant turbo-generator in its Miller's Ford plant and subsequent enlargement of the building and installation of other necessary equipment are major items in the $3,000,000 expansion program announced last week by the Dayton (Ohio) Power & Light Company. The work will take some sixteen months.

The General Electric Company has been awarded the contract for the 42,000-hp. turbo-generator to be installed. Construction of a dam in the Miami River, adjacent to the station, recently was completed.

The company plans to finance the project through the sale of mortgage bonds.

•

New P.W.A. Contract Loses in Duke's Test

The revised P.W.A. contract form, designed to strengthen the federal agency against power company suits attacking government loans for construction of competing facilities, was declared invalid recently by U. S. District Judge H. H. Watkins in Greenville, S. C., reaffirming Duke Power Company's earlier victory in its fight against the $2,800,000 Buzzard's Roost loan.

This sent the fight, which is in the courts of half a dozen states and the District of Columbia, toward the U. S. Circuit Court of Appeals once more while the P.W.A. was winning another brush in the Court of Appeals for the District of Columbia which remanded to the D. C. Supreme Court for reconsideration, due to the new contract, the four suits pending there.

Another important challenge to P.W.A. was started recently when Judge J. Lyles Glenn, of Chester, S. C., issued a show cause order as to why the Santee-Cooper authority should not be restrained from carrying out its $37,000,000 project. The order was issued in the suit brought by Carolina Power & Light Company, charging use of federal funds to compete with existing power facilities.

•

Extra Dividend Declared by Electric Controller

An extra dividend of $1 on the stock of the Electric Controller & Manufacturing Company has been declared.

A. G. & E. to Contest Any Reorganization

After filing liens claiming income tax deficiencies against the Associated Gas & Electric System, its affiliates and officers, totaling more than $60,000,000, the United States Government, at a reorganization hearing before Federal Judge Julian W. Mack, indicated that it would co-operate with creditors seeking reorganization of the company under the bankruptcy law.

Francis H. Horan, head of the civil division of the United States Attorney's office, who obtained permission to appear as a friend of the court, said following the hearing: "It is claimed that there are more than 300,000 holders of the corporation's securities, including a large number of debenture holders. The interest of this large number of holders of securities is recognized to be of primary importance, and the Commissioner of Internal Revenue and his representative here desire to avoid the necessity for taking any summary action with respect to distraint against the assets of the company if some other legal means can be found which will provide for the government's large interest in the matter . . ."

In response the Associated issued a statement revealing that it was not contemplating filing any action for reorganization under Section 77-B of the Bankruptcy Act. "The management, after being duly advised by its experts, is convinced that the company is not insolvent and that to admit insolvency in the present proceeding would be a breach of trust to the security holders. . . . Further simplification of the corporate structure is under way and will be rapidly expedited."

Meanwhile one of the threats overhanging Associated Gas, its executive personnel and Howard C. Hopson was removed when a Federal Grand Jury, after a three months' investigation, reported no grounds for criminal indictments in alleged mail fraud statute violations.

•

Rates Cut $14,617,000

Municipal and private utility rate reductions during 1935 in the state of New York totaled $14,617,000 on an annual basis, the joint legislative investigating committee reports.

New York Metal Prices

	Dec. 18, 1935 Cents per Pound	Dec. 31, 1935 Cents per Pound
Copper electrolytic	9.25*	9.25*
Lead, Am. S. & R. price	4.50	4.50
Antimony	13.875	13.25
Nickel ingot	35.00	35.00
Zinc spot	5.225	5.225
Tin Straits	49.75	48.625
Aluminum, 99 per cent	19—21	19—21

*Delivered Connecticut Valley

MANUFACTURING AND MARKETS

Business Looks to Washington

Favorable	Unfavorable
Industry resists seasonal lag.	Congress goes into session.
Business leaders optimistic for 1936.	"Breathing spell" due for test.
Building contracts continue high.	Vital high court decisions impend.
Big P.W.A. appropriation seen.	Christmas trade below expectations.
Stocks close year buoyant.	New capital market stagnant.

Denver Again Stages Christmas Contest

The Rocky Mountain Electrical Association's December electrical jubilee ended with Denver the usual blaze of lights in the annual Christmas lighting contest sponsored jointly by the Electrical League of Colorado and the Denver *Post*.

The largest merchandising drive was that from December 4 to 7, in which 14,481 visitors saw the electrical exposition and placed orders running to $225,000. Tickets were half questionnaire and showed that 724 housewives wanted kitchen mixers, 574 all-wave radio sets, 443 I.E.S. lamps for the living room and 408 electric refrigerators.

When the Rocky Mountain Electrical Association and the Electrical League of Colorado launched their co-operative project several years ago their members did only 20 per cent of the appliance business in the area; now they do 60 per cent. The other 40 per cent goes to Public Service of Colorado—and the utility still has a larger dollar volume in appliances than it had in the days when its share was 80 per cent of the total.

•

Refrigerator Sales Rise

Household electric refrigerator sales in November were 42,706 against 24,697 in the like 1934 month, bringing the eleven months' total to 1,377,717 compared with 1,096,411 a year earlier, according to NEMA records. November volume was valued at $3,700,512 against $2,354,983 in 1934.

•

Model Turbine Tested

A model of the hydraulic turbines to be made for use at Boulder Dam by the Baldwin-Southwark Corporation was tested in the company's I. P. Morris division laboratories recently under conditions designed to parallel actual operation. The test, with a model one-eighth actual size, was undertaken to determine whether any changes are desirable. Each finished turbine is to develop 115,000 hp. under a head of 480 ft. at a speed of 180 r.p.m.

•

Air Conditioning vs. Dust

The "black blizzards" in the Kansas "dust bowl" in recent summers prompted air conditioning of the U. S. Army's Signal Corps telephone exchange at Fort Riley, Kan., to protect the equipment from possible recurrence of the drought scourge. The installation is a 7½-ton system put in by Westinghouse.

•

Sangamo Employees to Share in Profits

Additional compensation for all employees who have been with the company for more than two years was voted by Sangamo Electric Company last week by means of a "compensation warrant" which will pay dividends much like a common stock certificate. Sangamo recently resumed dividends with a 25 cent quarterly common payment and an extra of 25 cents. In the future workers will receive extra compensation every time a dividend is declared on the stock in the ratio of twice the amount of the dividend for each year of service. In other words, a five-year employee would get ten times the amount paid on each share of common stock.

•

Hecht to Talk on Light

Recognizing the important effects lighting is having on architecture and decoration, the New School for Social Research, New York, announces a series of weekly lectures throughout January by Prof. Selig Hecht. The talks will deal with the nature of some major visual problems and the biological arrangement which underlie their solution.

•

Siegfried Roebling Dies

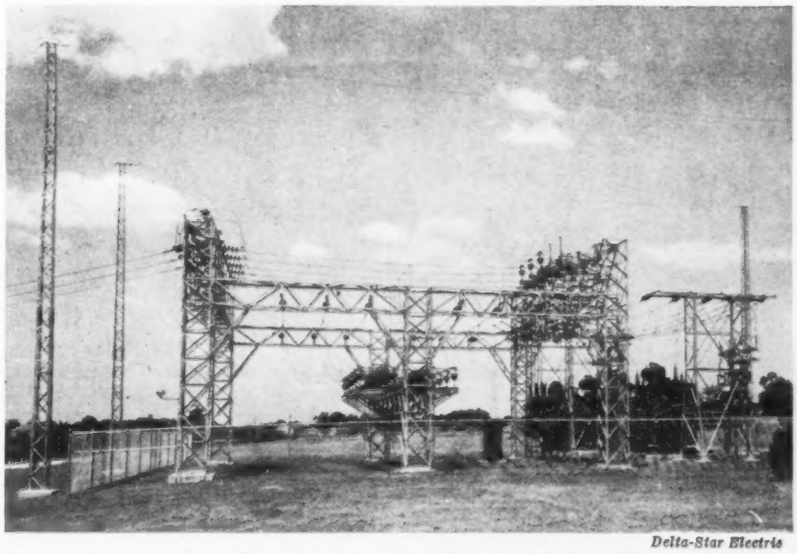
A heart attack on the morning of January 1 was fatal to Siegfried Roebling of Trenton, N. J., second vice-president of the John A. Roebling's Sons Company, in Los Angeles. Mr. Roebling had flown west for the Rose Bowl football game. A grandson of the Brooklyn Bridge designer, he was 45 years old.

•

Would Simplify Rates

Agitation for a statewide mandatory form of simple block rate schedules for electric service has started in New York with Judge John E. Mack, counsel for the joint legislative investigating committee, declaring that methods of computing energy used and of billing customers are "baffling and too easy of manipulation."

WILSON DAM SUBSTATION NEARS COMPLETION



Delta-Star Electric

View of the 44,000-volt steel-tower substation at Wilson Dam in Alabama, a T.V.A. project. The three- and six-pole disconnecting switches are shown on the right hand tower and on the center bay structure.

Christmas Party Breaks Up Strike

Three days before Christmas striking workers of the Ohio Insulator plant of the Ohio Brass Company were meeting in suburban Barberton to consider peace terms in the walkout. In a few minutes they would be obliged to vacate the hall to make way for a Christmas party being given for their more than 200 children. So, with a rising, unanimous vote, they fell into the spirit of the season and agreed to resume their jobs.

It was announced that the company agreed to take back employees without discrimination, give a guaranty of seniority rights and bargain collectively with the 300 men. Wages, hours and working conditions are to be settled later.

•

Kelvinator to Introduce New Ice Cream Chests

Ideally suited for the handling of small quantities of ice cream in drug stores, confectionery stores, restaurants, hotels or building lobbies, two new, self-contained, Kelvin chest ice cream cabinets will be introduced by Kelvinator Corporation early this month, according to an announcement made by Edward R. Legg, manager of Kelvinator's national direct sales division. The new models will be of the three-in-line and four-hole, double-row type, providing for maximum storage space of ice cream in the smallest practical type of cabinet.

•

Range Sales to Gain

Outstanding progress in electric range sales in 1936 due to much wider acceptance of electric cookery was predicted at the annual sales meeting of Electromaster, Inc., in Detroit, by Gerald Hulett, vice-president in charge of sales administration. The gathering was under the supervision of Walter C. Ayers, sales manager.

•

Contest Tops Quota

Results of the Electrical League of the Niagara Frontier's lighting contest in the last three months of 1935 far exceeded expectations, according to Samuel S. Vineberg, manager and secretary, with 750,000 watts of modernized lighting sales.

•

Graybar Ten Years Old

The expanded line of products handled and the purchase of the company by its employees were noted by Graybar Electric Company, Inc., as two of the important developments of its first decade as the company passed its tenth anniversary on January 1. The company was organized by Western Electric in 1926 and named after the men who founded the original business in 1869—Gray and Barton.

•

Steam Plant Awarded

The Foster-Wheeler Company of St. Catharines, Ont., was awarded a major portion of the contract for the new $1,000,000 steam plant to be built by the Ontario Paper Company. The steadily increasing load on the Niagara system of the Hydro and the cancellation of the Quebec power contracts brought about the move, as the new plant will replace the electric boilers.

•

Rural Sales Training

A short training course will be held at General Electric Institute, Nela Park, Cleveland, on January 13, 14 and 15, to teach new and inexperienced rural men of the electric utilities how to build the power consumption of farms. The latest electric equipment will be shown, the 150 men in attendance will be told how it is used and why the farmer needs it, and the profit it will return is to be pointed out. Representatives of six utilities aided in drawing up the program.

•

B.C. Electric Meets Tariff Price Problem

With a view to forestalling any tendency to defer purchases of the major electric appliances on account of the new tariff adjustment between the United States and Canada, the British Columbia Electric Railway Company has assured potential purchasers, through large space in newspapers throughout its territory, that it will give them protection in the event of price reductions. The company states that it will readjust prices on refrigerators, washing machines, radios, ranges and cleaners purchased from them between November 22 and January 15.

Field Reports on Business

The opening of Congress engenders some uncertainty, but business sentiment continues definitely optimistic, reports to ELECTRICAL WORLD indicate.

NEW ENGLAND

Record-making power outputs, a rising tide of interior wiring business, improvement in industrial equipment sales and a better holiday trade in household appliances marked the close of the year. Signs of more favorable business in the heavier industries also appeared in December. The Connecticut Light & Power Company has purchased an 8,200-kw. water-wheel driven generator for its Stevenson plant, and a small municipal station has bought a 300-kva. hydraulic generating unit for early use. Other generating apparatus is under negotiation. A Bay State municipal station, which buys energy from a large utility, has ordered a 1,500-kva. transformer for duplicate service.

Leading retailers report an appliance trade well ahead of last year's, and radio sets have moved faster and with less insistence on higher trade-in prices. Portable lamps have done remarkably well. Commercial refrigerating outfits for counter service are moving more actively in central New England. Wholesale trade is better, notably in wire and wiring devices, and one prominent house reports 10 per cent better volume than in 1934. Fixture movement is very gratifying.

Mill modernization with corresponding purchases of motors and controls is under way in many localities. A representative motor manufacturer reports improving sales of outfits of 25 hp. and over, and one house recently sold a 100-hp., 4-speed induction motor to a rubber factory for calendar drive. Considerable improvement is apparent in some areas in the textile and shoe industries, while machine tool plants are picking up.

CHICAGO

Orders that had been anticipated for early in 1936 but have, in some instances, crowded themselves into the closing days of 1935 make the business picture here look brighter than is usual for the year-end period. Turbine orders, one for 2,500 kw. from an industrial, and from utilities—one for 25,000 and another for 5,000 kw.—plus buying little if at all diminished from the levels of previous weeks kept sales offices pretty happy through the whole holiday season.

So far as utilities are concerned, however, it is plainly apparent that purchasing is being done only under strong pressure from operating departments and not at all as any expression of executive confidence. The tone of year-end statements from utility men is frankly apprehensive. Therefore, while orders came in faster and sooner than expected, there is not observable the market briskness and enthusiasm that would accompany business improvement on a firm basis. This attitude is a contagion easily communicated and can be seen in other fields as well.

Manufacturers of appliances and other electrical equipment in the class of consumer goods will tell in their annual reports a common story of business increases in 1935.

NEW YORK

Industrial leaders entered the New Year voicing optimism, an optimism based on business indexes well above a year ago and firmly resisting the customary holiday letdown. Yet notes of uncertainty were not infrequent, conspicuously among ranking executives in the utility industry, and both the convening of Congress and advent of the election year added to these doubts. How seriously can the "breathing spell" be taken? To what extent will Congress tend to upset the apple cart? What will be the effect of the pending Supreme Court decisions?

Electrical appliances cut a handsome slice of Christmas business, preliminary reports indicate, and holiday trade set good gains even though it did not quite come up to expectations. Power output continues very high and utility inquiries for generating equipment are becoming more tangible.

December was an active month in the copper markets with spot prices firm. When the brass fabricators come back into the market this week it is felt there is a good chance for a higher domestic price.

Contradictory Trends in 1935

[*Continued from page 87*]

Railroad's electrification project between New York and Washington.

Hydro-electric power regained its normal proportions, due to copious precipitation on both the Atlantic and Pacific coasts. Output approximated 40,000,000,000 kw.-hr. for all enterprises which contribute to the public supply, an increase of about 6,000,000,000 kw.-hr., or 17½ per cent above the figures for 1934 and also establishing a new record. Production of electricity by the use of fuels showed an increase of about 2,000,000,000 kw.-hr., or 4 per cent above the year 1934, and approximated 59,000,000,000 kw.-hr.

The number of consumers showed an increase of about 550,000 to a grand total of 25,350,000 at the end of 1935. The number of farms served by utility lines increased by some 40,000 during the year to a total of 785,000. As in recent years, however, some of these were not real "farms"—in the sense that they were occupied by persons making a living from agricultural pursuits—but were farm properties which had been bought by city people as a hedge against inflation.

Rates were lowered

In accordance with the usual practice of the industry, the level of rates was again lowered during the year for practically every class of consumers. Except for a few months during the war, the average price of industrial power was the lowest in the history of the electric industry. At the end of the year 1935 the average price of electricity for household use stood at 5.04 cents per kilowatt-hour, as compared with 5.30 cents for the preceding year.

Since 1913 the average price of domestic current declined by 42 per cent, although the general cost of living still remains some 40 per cent *above* the 1913 level. The domestic consumer's average bill is only 9 cents a day and the average family spends less for electricity than it does for tobacco or confectionery. For every penny that the typical American family spent for electric service in 1935 it spent more than 22 cents on the cost of government. If, instead of building competitve plants at the taxpayers' expense, the government really desires to help its subjects struggling under a rising cost of living, it might with far greater profit devote its energies to a reduction in its own cost.

Costs affect profits

Due to reduced rates for all classes of service, gross revenues showed a much smaller rate of gain than kilowatt-hour sales and approximated $1,917,000,000 for the year 1935. While this represented an increase of $80,000,000, or 4 per cent over the previous year, it still was $74,000,000 below the figures for 1930, the high record for the industry. A large part of this gain in revenues over 1934 was consumed in the higher cost of doing business. Taxes continued their upward march and approximated $260,000,000, or 14 per cent, of revenues from consumers. For 51 days out of the year the utilities work for the government alone.

Although actual maturities totaled only $140,000,000, electric utility companies were able to take advantage of favorable conditions in the money market to execute a large amount of refinancing up to the time when the December 1 "deadline" of the Utility Act put an end to further capital issues. A total of nearly $1,100,000,000 in securities were issued during the year by utilities furnishing electricity, as compared with $131,000,000 the year before. Of this year's total, however, less than $50,000,000 can be set down as new capital, which compares with an annual average of about $650,000,000 for the decade prior to 1931.

Outlook for 1936

In looking forward to the new year, a conservatively optimistic attitude seems warranted as to the operating results of the electric light and power industry. The holding of its gains by business in general and the carrying over into next year of the satisfactory results of electric appliance sales are favorable factors. It is to be hoped that the government will realize the impossibility of spending its way into prosperity and that the saturnalia of federal expenditures on competitive electric plants has passed its peak. Until, however, the courts have clarified the position of the utility companies under all the legislation of the past three years the position of the investor will remain increasingly uncertain.

Seize the Opportunity

[*Continued from page 91*]

the increased purchasing power they will have from their present incomes if the tax collector gets less and also show them the hidden taxes they do not realize they are paying. If we do that, the voters can and will do the rest, and taxation will then go down, as there will be less spending by all governmental agencies. Here, again, we can help place more of our total national income into wealth-producing channels and put more wealth and dollars into the hands of the consumer.

Give the facts

Educate our people in sound economics that they may return to the only sure ways of both creating individual wealth and increasing national income. Give them the facts on taxation and governmental spending and show them its effect on their own incomes and pocketbooks; improve and extend the usefulness of our own products, reduce their cost and give more service and products per dollar. Then we will be doing our part further to raise the American standard of living and put it back on a higher plane than ever before. Improve the standard of living and our industry and our country will have greater prosperity than it ever had before.

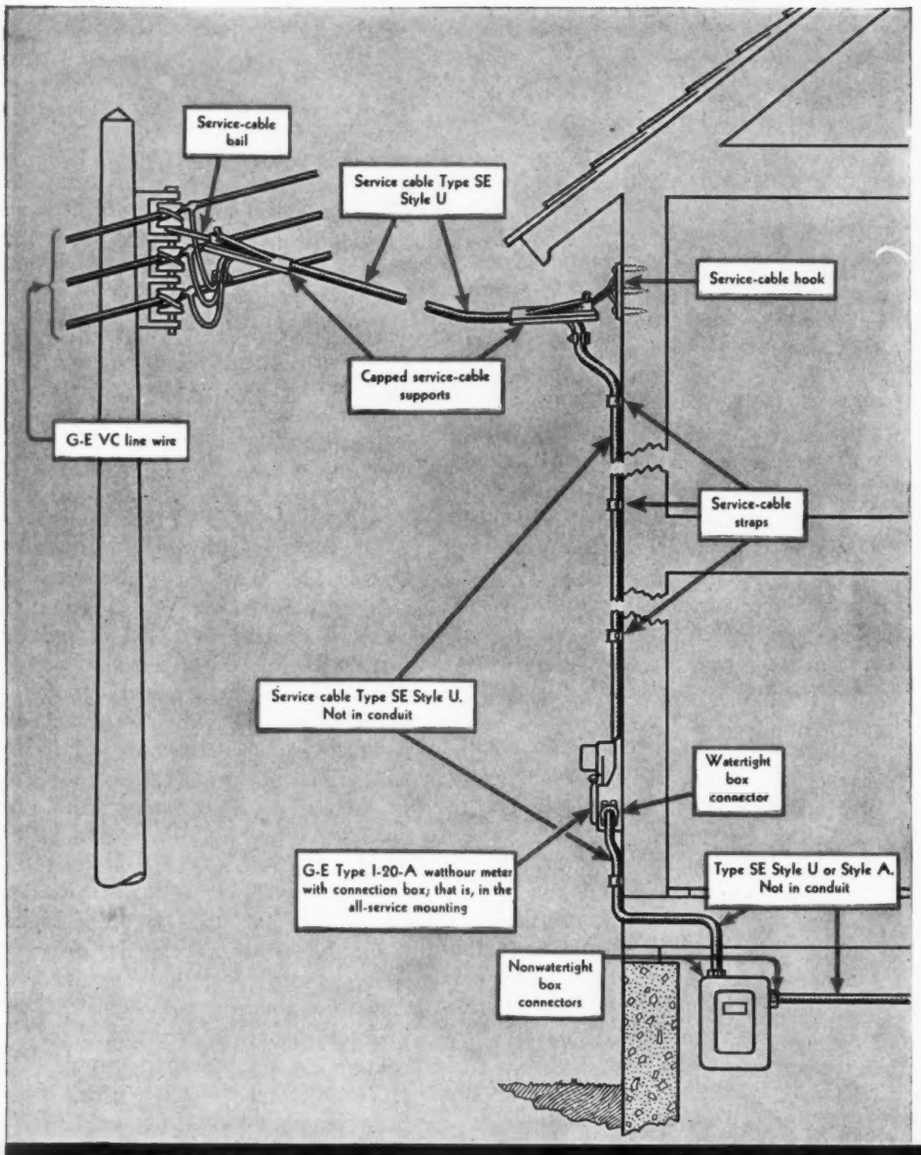
Here is our golden opportunity. Have we brains enough to grasp it and guts enough to act? I think we have.

•

New Highs Predicted for Air Conditioning

Refrigeration and air conditioning have received considerable news attention recently, among the items being the prediction of David L. Fiske, secretary of the American Society of Refrigerating Engineers, that a gain of one-third should be recorded in 1936 commercial air conditioning. J. J. Donovan of General Electric also forecast new high marks in this line next year.

Records in household electric refrigerator sales also continue with the October domestic and export total reported by NEMA at 51,588 units valued at $3,926,439, compared with 37,854 worth $3,116,843 a year earlier. The industry has been asked, however, to give more study to the problems of farm refrigeration, W. R. Woolrich of the University of Tennessee telling the A.S. of R.E. that manufacturers could well devote more attention to the diversified farm needs.

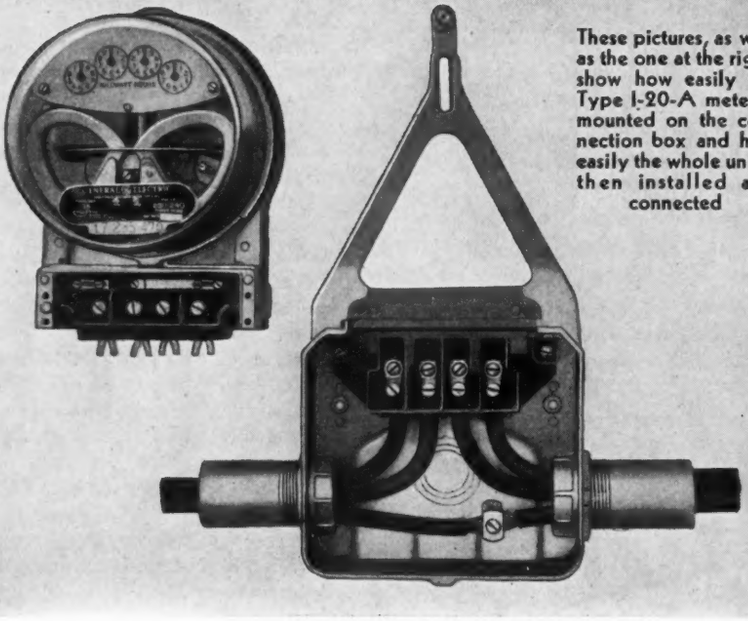

Service-cable bail
Service cable Type SE Style U
Service-cable hook
Capped service-cable supports
G-E VC line wire
Service-cable straps
Service cable Type SE Style U. Not in conduit
Watertight box connector
G-E Type I-20-A watthour meter with connection box; that is, in the all-service mounting
Type SE Style U or Style A. Not in conduit
Nonwatertight box connectors

NOW

COMPLETE INSTALLATION

THIS drawing shows a popular method of making an outdoor meter installation. It is simple and especially economical because it requires only one type of cable, SE Style U cable, and that can be run without a break from the pole to the house, down the side of the house to the meter, and then, without an entrance cap, into the house.

FEATURES OF G-E ALL-SERVICE METER MOUNTING



These pictures, as well as the one at the right, show how easily the Type I-20-A meter is mounted on the connection box and how easily the whole unit is then installed and connected

GENERAL ELECTRIC OFFERS A COMPLETE METER INSTALLATION

Includes watthour meter and accessories . . . service cable and fittings

NOW you can take advantage of complete meter equipment from General Electric — the only manufacturer that makes everything for use from pole line to building to service cabinet — watthour meter and accessories, service cable and fittings.

WATTHOUR METER

Illustrated, on the right, are the three models of I-20 metering. All have the same element, the well-known I-20, and differ only in the method of mounting. With these three mountings an electric-service company can meet every installation requirement most economically.

All-service Mounting

This is the standard Type I-20-A watthour meter in the new *connection box* with complete test and disconnection facilities.

Socket Mounting

This is the standard Type I-20-S socket watthour meter.

Enclosed Mounting

This is the standard Type I-20-A watthour meter in the new *protector case* with complete test and disconnection facilities.

TAMPERPROOF SERVICE CABLE

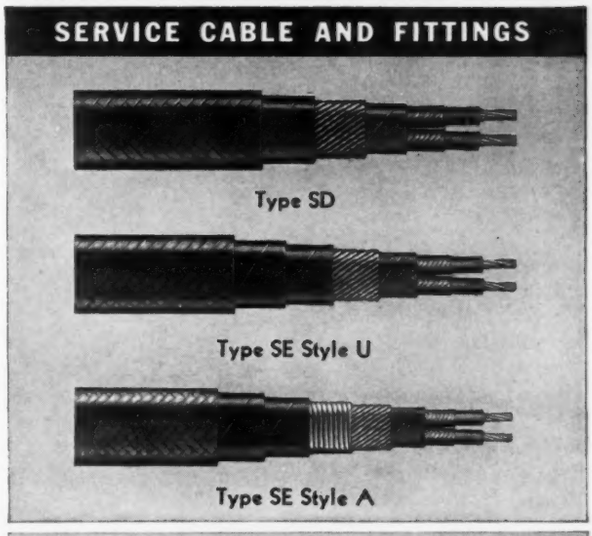
The first type illustrated is SD. This is a concentric-ground-wire type with an over-all braid finish, which is flame-retarding and moisture-resisting.

Next is the popular Type SE Style U, which is identical with the Type SD except that it has additional moisture-resisting protection.

The third is Type SE Style A, which is identical with Type SE Style U except that a D-shaped galvanized-steel armor is applied over the concentric conductor.

These three types of General Electric tamperproof service cable have Underwriters' approval and carry Underwriters' labels.

For more detailed information on General Electric metering equipment, address the nearest G-E sales office or General Electric, Dept. 6A-201, Schenectady, N. Y.



GENERAL ELECTRIC

406-15

MEN OF THE INDUSTRY

Chicago Utility Reinstates E. J. Doyle as President

Edward J. Doyle has been reinstated as president of the Commonwealth Edison Company by the board of directors, filling the vacancy that has existed since his resignation was announced in February, 1934, following his indictment with a score of others after the collapse of the

E. J. Doyle

Insull system. Mr. Doyle has been cleared of all charges. Mr. Doyle became president of Commonwealth Edison in 1930 after spending 34 years in the service of that company and its predecessor, the old Chicago Edison Company. Starting as office boy in 1896, he became private secretary to Samuel Insull, then assistant secretary and assistant treasurer in 1913, secretary and treasurer the following year, and in 1924 vice-president in charge of finances, securities and claims. In 1930 he succeeded Samuel Insull as president.

Several other changes also were announced following the meeting of directors. LOUIS A. FERGUSON, vice-president in charge of operating, construction and electrical departments, retired December 31 after forty-seven years of service with Commonwealth Edison. Retiring at the same time was W. L. ABBOTT, chief operating engineer, who recently completed fifty years of service. HARRY B. GEAR was elected vice-president in charge of operating and engineering and A. G. DECLERCQ, head of the construction department and general service manager, was elected vice-president in charge of service and construction. Mr. Gear entered the employ of the company as an electrical inspector in 1895, following graduation from Cornell University. Mr. DeClercq entered the testing department of the company in 1899. A. D. BAILEY, assistant chief operating engineer, was appointed chief operating engineer. WILLIAM H. CULVER, who has been in charge of publicity and advertising for several years, has resigned. E. FRANK GARDINER, assistant to Mr. Culver, will act in his place until further notice.

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► W. W. GLOSSER has been elected vice-president of the Pacific Coast division of Hubbard & Company. In his new capacity Mr. Glosser will have charge of the company's operations in Arizona, Nevada and the three Pacific Coast states. He is well known in the industry, having been Hubbard's Pacific Coast manager since 1929. Prior to that time he was district manager in New York City.

► AMBROSE SWASEY, internationally known turret lathe and telescope builder and chairman of the Warner & Swasey Company, Cleveland, celebrated his 89th birthday on December 19. On this occasion as a birthday gift the company presented to its alert, white-haired head the completed 82-in. reflector telescope which has been built for the McDonald Observatory in western Texas. At a luncheon more than a hundred of Cleveland's prominent citizens joined with scientists and manufacturers from all parts of the country in paying honor to Mr. Swasey. Following the luncheon the telescope was operated under its own power by E. P. Burrell, the company's director of engineering and the telescope's designer.

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E. Schram Succeeds Cooke as President of E.H.F.A.

Emil Schram, formerly chief of the drainage, levee and irrigation division of the Reconstruction Finance Corporation, has been appointed president of the Electric Home and Farm Authority to succeed

Emil Schram

Morris L. Cooke, who recently resigned as president but retains his post as director. G. B. Coit, previously chairman of R.F.C.'s industrial loan review committee, is now vice-president of E.H.F.A.

A. R. Wellwood New Director of Electric Rate Survey

Arthur R. Wellwood, who has been appointed director of the Electric Rate Survey (ELECTRICAL WORLD, December 21, page 72), has had 23 years of experience in the electric utility field on engineering, construction, operation, management and regulation problems for utilities, state and

Harris & Ewing

A. R. Wellwood

federal governments, and in private practice. He has been resident engineer in charge of preliminary engineering and construction on the Drehers Shoals power project near Columbia, S. C., chief engineer of the South Carolina Power Rate Investigating Committee, chief consultant to the Public Service Commission of South Carolina and a member of the special engineering staff that made a Super-Power Survey for the U. S. Government. He has also conducted statewide and regional surveys in many parts of the country.

Major Wellwood is a member of the American Institute of Electrical Engineers and a charter member of the American Society of Military Engineers.

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► RICHARD P. JOHNSON, formerly in charge of the Detroit office of the Kuhlman Electric Company, has been appointed assistant sales manager of the company with offices in Bay City, Mich.

► K. J. GRANBOIS, formerly with the Pennsylvania Water & Power Company at Holtwood, is now test engineer for the Safe Harbor Water Power Corporation at Safe Harbor, Pa.

► L. R. BOULWARE has been appointed vice-president and general manager of the Carrier Engineering Corporation of Newark, N. J. For the past eleven years Mr. Boulware has been general sales manager

GEORGE WASHINGTON BRIDGE ✦ INLAND TERMINAL BUILDING, NEW YORK

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47 YEARS
OF KNOWING HOW

CRESCENT CABLE

After the job (Chicago Post Office) was completed, Mr. A. S. Schulman told us that his total labor cost was considerably less than he estimated it would be due to the excellent finish and flexibility of
CRESCENT WIRE

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INSULATED WIRE & CABLE CO. INC
TRENTON, NEW JERSEY

DEPARTMENT OF AGRICULTURE, EXTENSIBLE BUILDING, WASHINGTON, D. C.

of the Easy Washing Machine Corporation, Syracuse, N. Y. Prior to his connection with the Easy Washing Machine organization he spent five years in Michigan, engaging in manufacturing, holding the positions of purchasing agent and factory manager.

▶ ROY M. GODWIN, director of safety, Philadelphia Electric Company, was elected general chairman of the public utilities section of the National Safety Council at the recent convention in Louisville, Ky. Mr. Godwin has served the public utilities section for a number of years. He is also a member of the Edison Electric Institute accident prevention committee and is a past-chairman of the American Gas Association accident prevention committee.

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U.G.I. Awards Bodine Medal to Philip H. Gadsden

Philip H. Gadsden, vice-president of the United Gas Improvement Company, has been made the recipient of the Samuel T. Bodine Meritorious Award, in recognition of his work as chairman of the Committee of Public Utility Executives. The award, established in 1925 and consisting of a medal and certificate, was presented by President John E. Zimmermann.

The citation read in part: "Tactful and patient, you maintained throughout, the wholehearted co-operation of the utility

P. H. Gadsden

executives of the country, representing as they do diverse interests and problems. . . . A fighter, but a fighter with a high concept of ethics and an unwavering fidelity to clean and aboveboard methods. You fought no defensive rear guard action. Backed by a devoted army, you not only stood your ground, but fearlessly and with vigor attacked with the truth every unfair statement or inference from those bent on the destruction of the interests you represented. Throughout this trying period you consistently exercised clear wisdom, sound judgment and forceful leadership, characteristics which had caused the utility executives of the country unanimously to select you to guide them through the greatest crisis the industry has ever faced."

B. Wiley Managing Director of Iron and Steel Engineers

At a meeting held December 14 the board of directors of the Association of Iron and Steel Electrical Engineers elected Brent Wiley managing director to succeed the late John F. Kelly, effective January 1. A graduate of Rose Polytechnic Institute in electrical engineering, Mr.

Brent Wiley

Wiley has been closely associated with the steel industry for the past 37 years.

After leaving college, he spent one year in the electrical department of the Ohio works of the Carnegie-Illinois Steel Corporation, later going to the Homestead works of the same company as assistant to the electrical superintendent. Leaving the organization in 1904, Mr. Wiley became affiliated with the Wellman-Seaver-Morgan Company in Cleveland as electrical engineer. In 1906 he joined the Westinghouse Electric & Manufacturing Company, with which he spent the next 25 years. While he was affiliated with this company his duties were largely confined to the subject of the development of the electrification of the steel industry, which required considerable investigation and engineering work.

Mr. Wiley has been a member of the Association of Iron and Steel Electrical Engineers for the past 25 years.

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▶ O. E. WASSER, formerly controller of the Associated Gas & Electric Company, has been elected vice-president. T. F. Rowe of Ithaca, division auditor for six years, has been elected to the office of controller to succeed Mr. Wasser.

▶ JOSEPH H. BODWELL, formerly a county agent in Maine and Massachusetts in the government extension service to rural areas, has been appointed rural development engineer for the Public Service Company of New Hampshire, with headquarters at Manchester.

▶ LANE D. WEBBER, for thirteen years vice-president and trust officer of the First National Trust and Savings Bank, San Diego, Calif., has been appointed tax counsel for the Southern California Edison Company, Ltd. Mr. Webber has resigned from his San Diego position and has taken over his new work with the Edison Company. He will continue to serve as a director of the bank.

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W. M. Dale Assigned to New Executive Position

W. Marshall Dale of Indianapolis has been named vice-president and general manager of the Indiana Service Corporation to succeed S. E. Mulholland, who resigned from that position and was placed on the retired list after 40 years of continuous service in the utility field. Mr. Dale now is treasurer of the Public Service Company of Indiana and also is a director of that company. He took over his new duties January 1.

Mr. Dale has been active in the utility field since 1913, when he entered the employ of the Kentucky Utilities Company. He later became manager of utility properties in Virginia and, in 1920, he was made manager of the investment department of that company with headquarters in Louisville. In July, 1929, on completion of the co-ordinated operation of the Public Service Company of Indiana and other public utility and transportation companies in central and southern Indiana, he became treasurer of all companies within the group.

In announcing Mr. Mulholland's resig-

W. M. Dale

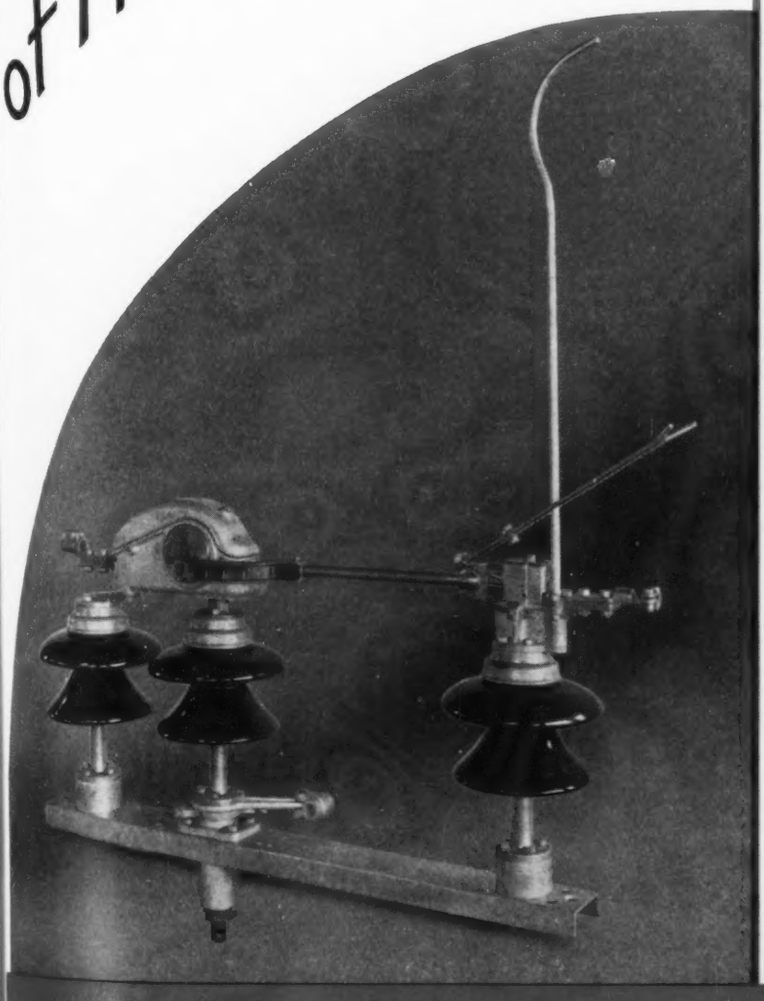
nation John N. Shannahan, president, expressing the regret of the board of directors at the resignation, said:

"It is with the deepest feeling of regret that the board announces the resignation of Mr. Mulholland. We wish to comment formally on the leadership which has marked his 40 years of service in the utility field. Although he has been eligible for retirement for several years, the board of directors has felt that during the recent trying years his continued guidance was necessary to the progress of the Indiana Service Corporation. He truly is a dean in the Indiana utility industry and his influence long will be felt in the field from which he is retiring with such an honorable record of achievement."

The board refused to accept Mr. Mul-

15 YEARS of Pioneering Produced this

—an AIR BREAK SWITCH of unquestioned superiority



IN 1920 Hi-Voltage introduced a Vertical Break Horn Gap Switch and predicted that within four years the Horizontal Break Horn Gap Switch would be considered obsolete. We were wrong. It was six or seven years later.

In 1921 Hi-Voltage introduced a Line Type Positive Pressure Main Contact for outdoor switches and predicted that within three years the area contact would be obsolete for this type of switch. Again we were wrong. Not until six years later was this principle accepted and the surface contact discarded.

In 1926 Hi-Voltage introduced Ball Bearings as standard construction for all sizes of Gang Operated Air Break Switches. It was a dry type bearing, monel balls in bronze races. It has not become standard yet, but we predict it will.

In 1928 Hi-Voltage introduced and standardized on a Heavy Duty Operating Mechanism with the main shaft mounted in ball thrust and guide bearings. At that time, we alone did not consider it an unnecessary refinement. The drilled hole in a steel plate is rapidly becoming obsolete.

AND NOW—Hi-Voltage introduced the Vertical Break Switch with a totally enclosed mechanism, a positive mechanism built to the highest degree of accuracy and practical refinement. Yes, and the compliments it has received almost match our pride in it.

In the future, you will buy equipment built to NEMA standards. In our new catalog you will find a complete line of switching equipment built and dimensioned to these standards.

SEND FOR BULLETIN NO. 26

HI-VOLTAGE EQUIPMENT CO.

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SUPERIOR
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*(BAIS-20)

These Superior Products will Fit Your Needs:

- FOR DIVERSION PREVENTION
  use Superior Overall Meter Enclosures
- FOR METER AND RELAY TESTING
  use Superior Test Switches and Blocks
- FOR ENCLOSING ELECTRICAL APPARATUS
  use Superior Sheet Metal Enclosures
- COPPER AND SHEET METAL SPECIALTIES
  for Special and Specific Purposes

The SUPERIOR SWITCHBOARD *and* DEVICES COMPANY . *Canton, Ohio*

*Been at it Since 1920

SUPERIOR
REG. U. S. PAT. OFF.

holland's resignation as a director and he will continue to serve in that capacity.

▶ D. W. MERSEREAU of Fredericton Junction, N. B., has been appointed a member of the New Brunswick Electric Power Commission, replacing J. D. Palmer of Fredericton, N. B.

▶ C. N. RICE, JR., formerly valuation engineer with Byllesby Engineering & Management Corporation, Chicago, is now with the Northern States Power Company at Eau Claire, Wis.

▶ H. S. KIRKPATRICK, formerly commercial manager of the Ohio Power Company, Canton, Ohio, has been transferred to Portsmouth as division manager of the company. He succeeds HUGH H. HIGGINS, who has been granted an indefinite leave of absence because of ill health.

▶ WARREN A. HERSEY has been appointed manager for the Boston Edison Company in the district embracing Winchester, Woburn, Stoneham and Burlington, Mass. Mr. Hersey was formerly engaged in refrigeration promotion work for the company, later becoming supervisor of salesmen in the northern district. For a time he was district manager in the Roslindale-Hyde Park territory.

▶ FRED W. BRIDLER has been named assistant chief engineer in the production department of the El Paso Electric Company. He was formerly with the Navasota division of the Gulf States Utilities Company. He succeeds J. A. Reich, who has been transferred back to the Virginia Electric & Power Company by the Stone & Webster organization. Mr. Reich was formerly with the Virginia company.

▶ JOHN J. BARRY has been appointed manager for the Boston Edison Company in the city of Somerville, Mass. He is widely known in the eastern Massachusetts utility field, having been chairman of the Lighting Engineers Club of New England and active for some years in the illumination field on the Edison system. Recently he has been identified with sales promotion work and dealer relations for the company.

▶ EBEN B. HASKELL, assistant power engineer of the commercial and industrial department, Charles H. Tenney & Company, Boston, has been appointed northeastern district power sales engineer for the New England Power Engineering & Service Corporation, with headquarters at Lowell, Mass. Mr. Haskell was graduated from the Massachusetts Institute of Technology in 1926, and after eighteen months at the General Electric Company's Schenectady works joined the Tenney organization, later specializing in industrial rates and then having more diversified duties in connection with these properties' power problems. Several years ago the Tenney group was acquired by the New England system.

Their Service Record tells the story

★ TRANSFORMERS are born of engineering experience and research, but must work and prove themselves in the field. In the final analysis, the service record proves the quality of any transformer—it tests and demonstrates the soundness of design, reliability of workmanship, and superiority of materials.

The accumulated service records of Kuhlman Transformers for 1935 are progressively better than in the many excellent years preceding. They tell an important story of reliability, over-all efficiency, and ability to "take it" in difficult spots.

"Controlled Surge" Distribution

Kuhlman "Controlled Surge" Distribution Transformers have provided the answer to the surge problem. The coil insulation is coordinated with a surge discharge path exterior to the coils—any surge will follow this path and not puncture the insulation.

This feature is standard in Kuhlman Distribution Transformers—costs nothing extra.

Welded Hangers and Other Features

Hangers welded to tank are optional feature which has proved of great value on many jobs; the kicker bar at bottom eliminates the lower cross arm.

Other features include: liberally proportioned ventilating ducts, modified shell type cores combining rigid construction with excellent performance, special low loss non-aging silicon steel cores, all bushings oversize and removable, etc.

Power Transformers

Kuhlman Power Transformers have established and continue to hold an enviable record of performance on lines of utilities throughout the country. The same progressive engineering by which Kuhlman has so advanced the distribution transformer, is applied to power and special transformers.

Write for Catalog No. 135

Kuhlman "Controlled Surge" Distribution Transformer with Stud Bushings.

Optional welded hanger with kicker bar at bottom that eliminates lower crossarm.

Kuhlman Power Transformer.

KUHLMAN ELECTRIC COMPANY
Bay City, Michigan

Transformer Specialist Since 1894

The Famous Family of

"MEGGER"

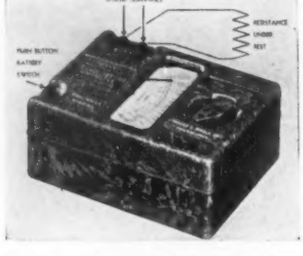
TRADE MARK REGISTERED U.S. PAT. OFF

Instruments

"Bridge-Meg" Resistance Tester
For testing insulation and conductor resistance.
Catalog 1400-W.

"Meg" Ground Tester
For measuring resistance to earth of ground connections.
Catalog 1425-W.

"Megger" Capacitance Meter
For measuring electrostatic capacity.
Bulletin 1405-W.



Midget "Megger" Circuit Testing Ohmmeter
Bulletin 1380-W.

FOR more than 25 years it has been our privilege to sponsor the ever growing and ever more prominent "Megger" group of electrical testing instruments; with the result that the trade mark "Megger" has become a household word throughout the electrical industry.

The instruments here illustrated have various important applications, and in their respective fields for measurements of insulation resistance, ground resistance, capacitance and purity of water, they bring that simplicity in use, and reliability and ruggedness which have always characterized "Megger" instruments.

Appropriate literature will be forwarded on request.

JAMES G. BIDDLE CO.

ELECTRICAL INSTRUMENTS

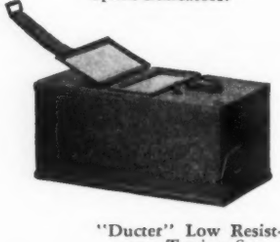
1211-13 ARCH STREET PHILADELPHIA, PA.

Other Biddle Specialties

JAGABI Rheostats, Hand Tachometers, Tachoscopes and Speed Indicators.

FRAHM Vibrating-Reed Frequency Meters and Tachometers.

Precision Resistances, Wheatstone Bridges and Potentiometers.



"Ducter" Low Resistance Testing Set
Bulletin 1295-W.

"Dionic" Water Tester
For testing condenser leakage and water purity.
Information on request.

OBITUARY

Robert Edwards

Robert Edwards, president-treasurer of Edwards & Company, Inc., New York, died December 27 at New Rochelle Hospital, following a short illness. As chief executive of that organization since 1912, Mr. Edwards carried forward the work and ambitions of his father, an electrical pioneer of the nineteenth century, who organized the business in 1872. It was in that year that Robert was born. He attended New York City's

Robert Edwards

public schools and the City College of New York, embarking on his business career in 1892.

His first position was with the Electric Supply Company of Chicago, but he soon joined the Central Electric Company of the same city, traveling in Michigan, Indiana and Ohio. Returning to New York Mr. Edwards became associated with Edwards & Company, where he remained until 1901, when he was appointed city sales manager for Western Electric. From 1910 to 1912 he was with Northern Electric in Canada as general supply sales manager. He organized the supply department of the company, returning in the latter year to Edwards & Company to take his father's place as president and treasurer.

Mr. Edwards has been active in the National Electrical Manufacturers Association for a number of years. At the time of his death he was a member of the board of governors and of the executive committee and was serving on two standing committees—the industry relations committee and the advisory publicity committee.

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► DR. HOWARD MCCLENAHAN, executive secretary of the Franklin Institute of Pennsylvania since 1925 and an internationally known scientist and educator, died of a heart attack, December 16 at Winter Haven, Fla., where he had gone to regain his health. He was 63 years old. Dr. McClenahan was dean at Princeton Uni-

NEW Electroline AUTOMATIC DEAD ENDS

STRONGER LINES

With Lower Construction Costs

3400 SERIES with Ball Strain Insulator adaptable to other type insulators

3300 SERIES used with Disc Type Suspension Insulator

4100 SERIES
Standard Disc type suspension insulator into which an Electroline Automatic Connector Unit is cemented.

These New Electroline Automatic Dead Ends not only save time and provide a stronger line construction but the use of other items and material is eliminated.

The automatic and positive gripping feature of the highly successful Electroline Automatic Line Splice is used in the New Electroline Dead Ends, in which the full strength of the conductor is developed without any slippage.

No tools, solder, or furnaces need be used to install an Electroline Dead End. Simply insert the bare ends of the wire as far as they will go—and tension immediately sets and locks the wedges, and the greater the line tension the tighter the wedges will grip.

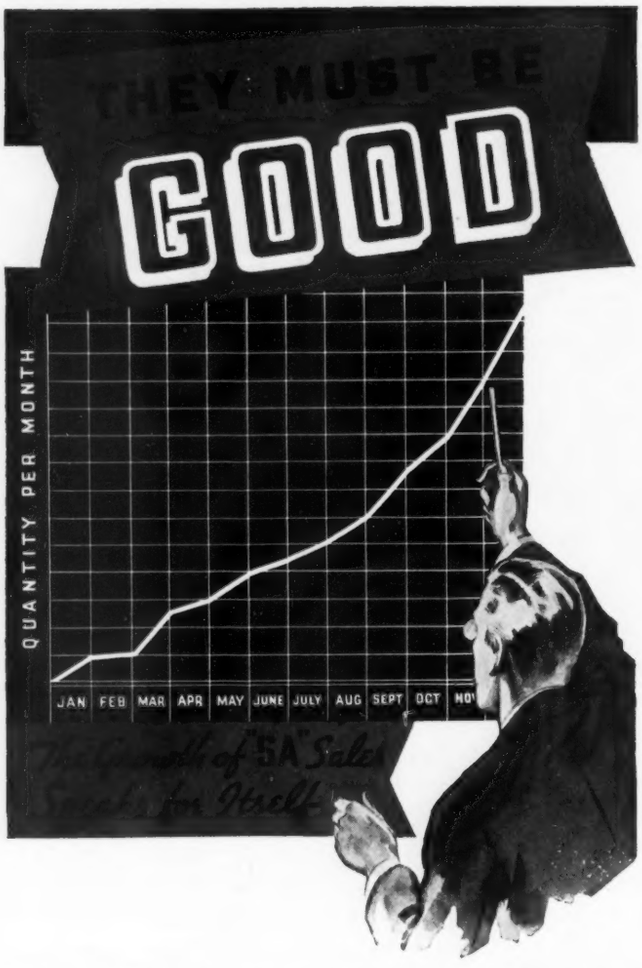
Three types are designed as shown in the accompanying illustrations, all three furnished with an anti-vibration tip to dampen vibration of the conductor at the point of contact.

Only non-corrosive materials hold the conductor.

Investigate this outstanding new line equipment. Bulletin containing full details of types and sizes promptly furnished on request.

Electroline Company

4121 South La Salle Street **Chicago, Illinois**



OPERATORS and electrical manufacturers alike have indicated their acceptance of the new "SA" Series Brushes by ordering again and again. A steadily rising sales curve reflects the universal satisfaction these brushes are giving—They MUST Be Good.

The "SA" Series consists of five electrographitic grades—SA-25, SA-30, SA-35, SA-40 and SA-45. These grades, definitely graduated in performance characteristics, cover a wide range of application on motors and generators in power and industrial service.

Their established superior performance merits a trial on your equipment.

There is a National Pyramid Brush for every class of service.

NATIONAL CARBON COMPANY, INC.
Carbon Sales Division, Cleveland, Ohio
Unit of Union Carbide UCC and Carbon Corporation
Branch Sales Offices: New York Pittsburgh Chicago San Francisco

versity from 1912 to 1925. He was one of several Americans to receive the distinction of honorary membership in the Royal Institution of Great Britain.

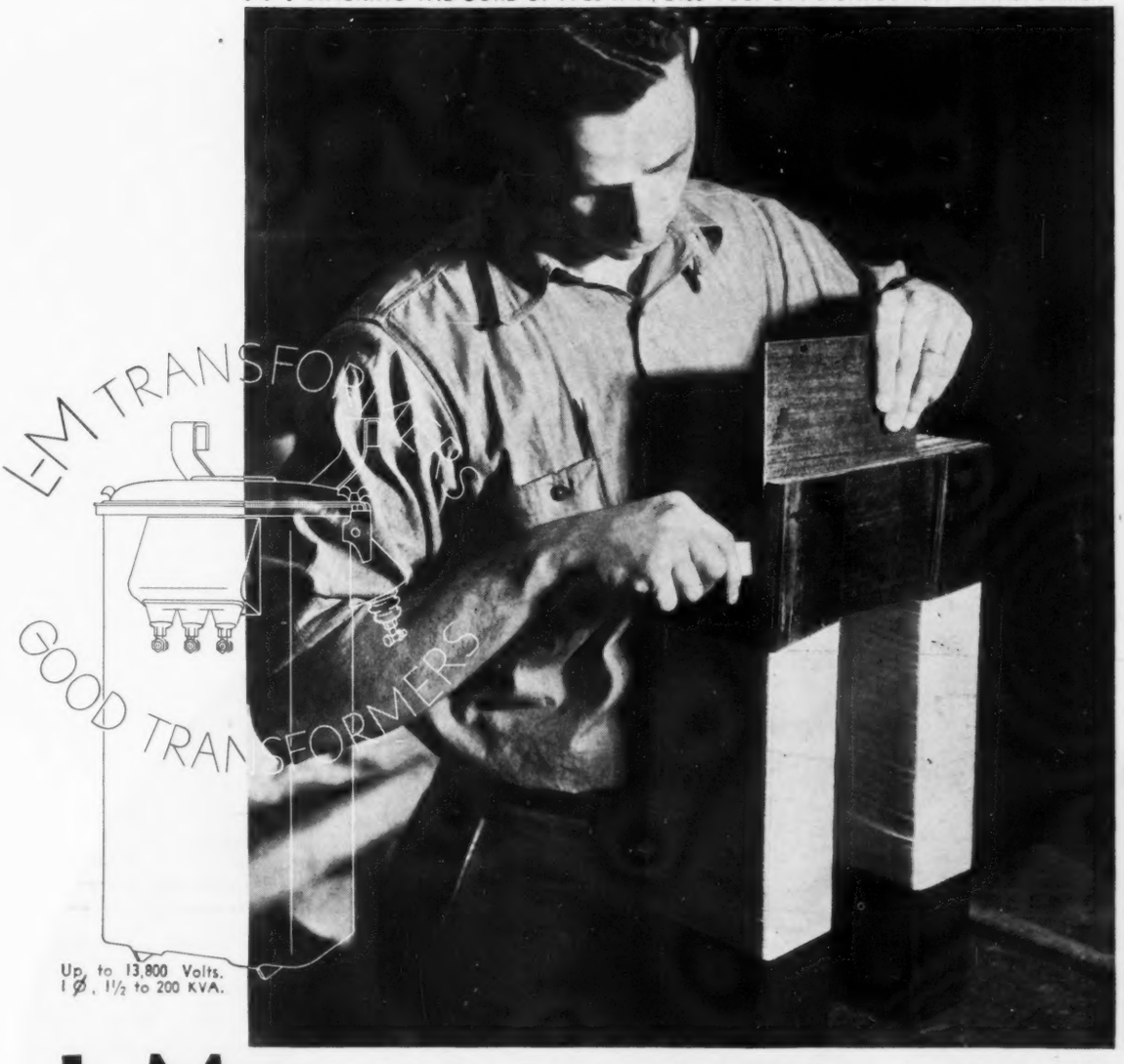
► WILLIAM W. MILLER, manager of the industrial department of the General Electric Company since 1929, died in Schenectady, N. Y., December 22, following an operation. Mr. Miller was twelve when he started working for General Electric during summer vacations. After the completion of his high school course, in 1897, he entered the General Electric's employ. He was 55 years of age.

► WILLIAM J. KEENAN, for many years vice-president of the General Electric Supply Corporation, and lately a special representative of that organization in the East, died at his home in Boston, Mass., December 22. He was born in Roxbury, Mass., in 1862, and after some years in the communication field became a salesman for the Pettingell-Andrews Company, Boston electrical supply jobbers. Ultimately he became vice-president of that house, and for some time specialized in the sale of electrical material in railroads. He was one of the most widely known figures in the electrical wholesaling field in the East.

► WILLIAM A. HANBRIDGE, one of San Francisco's pioneer electrical men, died of a heart attack, at San Rafael, October 28. Mr. Hanbridge, at the time of his death, was commercial lighting specialist for the Pacific Gas & Electric Company's North Bay division with headquarters at San Rafael. For many years before joining the sales staff of Pacific Gas & Electric Mr. Hanbridge was an electrical contractor in San Francisco, becoming at one time secretary of the San Francisco association. At a later time he had charge of all lighting activities for the San Francisco division of the power company. He also served on many committees of the Pacific Coast Electrical Association and was prominent in the activities of the Illuminating Engineering Society.

► FRANK BEVAN, known to the electrical industry in northern California as its prime showman, died of a heart attack, November 8. At the time of his death he was display manager for the Pacific Gas & Electric Company. He conducted an advertising agency of his own before becoming associated with Pacific Gas & Electric Company as a commercial lighting salesman. He was soon brought to the main office to head up lighting sales for the entire system. He handled all the company's show activities, displays, expositions and feature events. For the Pacific Coast Electrical Association conventions and for San Francisco Electrical Development League affairs his talent was utilized on every occasion. He had also been asked to prepare ideas for the forthcoming San Francisco World's Fair in 1938.

. . . STACKING THE CORE OF A 25 KVA, 2400 VOLT L-M DISTRIBUTION TRANSFORMER



L-M TRANSFORMERS HAVE RECTANGULAR CORES!

Rectangular cores facilitate repairs, coils can be replaced without returning the transformer to the factory.

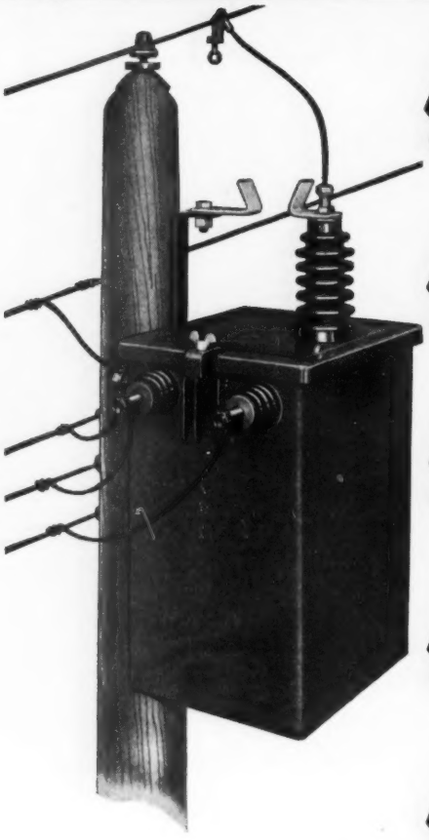
L-M Transformer cores are made of finest quality electrical steel sheets for low hysteretic losses. Sheets are thin, coated with special insulating varnish, to minimize eddy current losses. Precision sheared laminations and interleaved joint assembly keep the exciting current to a low value.

One reason why "L-M TRANSFORMERS ARE BETTER TRANSFORMERS."

LINE MATERIAL CO

SOUTH MILWAUKEE. WISCONSIN, U. S. A.

Check These Six Points of Superiority of Wagner FARM-LINE TRANSFORMERS for Rural Service



Hanger-irons and cross-arms for support are unnecessary, as mounting brackets are provided on tank for bolting transformer directly to the pole.

Service lines can be easily connected, since the low-voltage bushings are brought out the side of the tank.

No solder is required for connecting transformers to line—solderless connectors are used for all bushing terminals and grounding lugs.

Transformer is easy to hang — all that is necessary is to raise transformer so that the slotted mounting brackets slip over thru-bolts attached to the pole.

Transformer is self-protecting against lightning as it is equipped with a co-ordinating gap that is set to flashover at a value well below the surge strength of the transformer windings.

Transformer is shipped filled with oil ready for service. This is made possible by the use of stud-type-bushings which eliminate all syphoning of oil.

Wagner Farm-Line Type HEBF distribution transformers for rural service are built for operation on a three-phase four-wire service with solidly-grounded neutral. They are designed to reduce the cost of construction and operation of rural distribution lines and to provide maximum protection against heavy surges.

They are manufactured in 1- and 3-kva sizes for 60-cycle operation in the following standard voltage classes: 2400, 4800, 6900, 7200 and 7620 volts. For ratings other than the above, consult the nearest branch office.

Wagner Farm-Line distribution transformers have not only all these features, but many more. For further information regarding these transformers, write the nearest Wagner branch office. Descriptive literature will be sent upon request.

Wagner Electric Corporation

6400 Plymouth Avenue, Saint Louis, U.S.A.

TD236-1B

Transformers *Motors* *Fans* *Brakes*

Municipal Items

IOWA CITY, IOWA—Proposed work on the construction of a municipal light and power plant at a cost of approximately $1,500,000 has been halted through a federal court order issued by Federal Judge Charles A. Dewey in Des Moines. The order was issued on petition of the Iowa City Light & Power Company, now serving the city. The order specifically restrains the city officials and others from going ahead with a P.W.A. loan or grant until a hearing has been held.

CORBIN, KY.—Kentucky Public Service Commission has ruled that municipal light plants cannot contribute power and light free to any city departments, schools or churches. The case was that of the Corbin municipal electric plant, in which the commission found that the municipal plant had been making more than 17 per cent profit each year on the investments in the plant while giving service free to various city departments, schools and churches. Terming the practice discriminatory and barred by law, the commission reduced light rates 20 per cent, resulting in a saving of $15,000 annually to the consumers.

HOLYOKE, MASS.—Announcement has been made by the gas and electric department of a reduction of its rates for electricity for all classifications, effective January 1, 1936. The maximum of 4 cents per kilowatt-hour for domestic and commercial users will stand, but the maximum hours per month for this rate have been reduced from 100 to 50. For the next 50 kw.-hr. the rate will be 3½ cents and beyond 100 kw.-hr. and up to 200 it will be 3 cents. All above 200 kw.-hr. will be at 2½ cents. In the industrial classification a reduction of about 15 per cent is made.

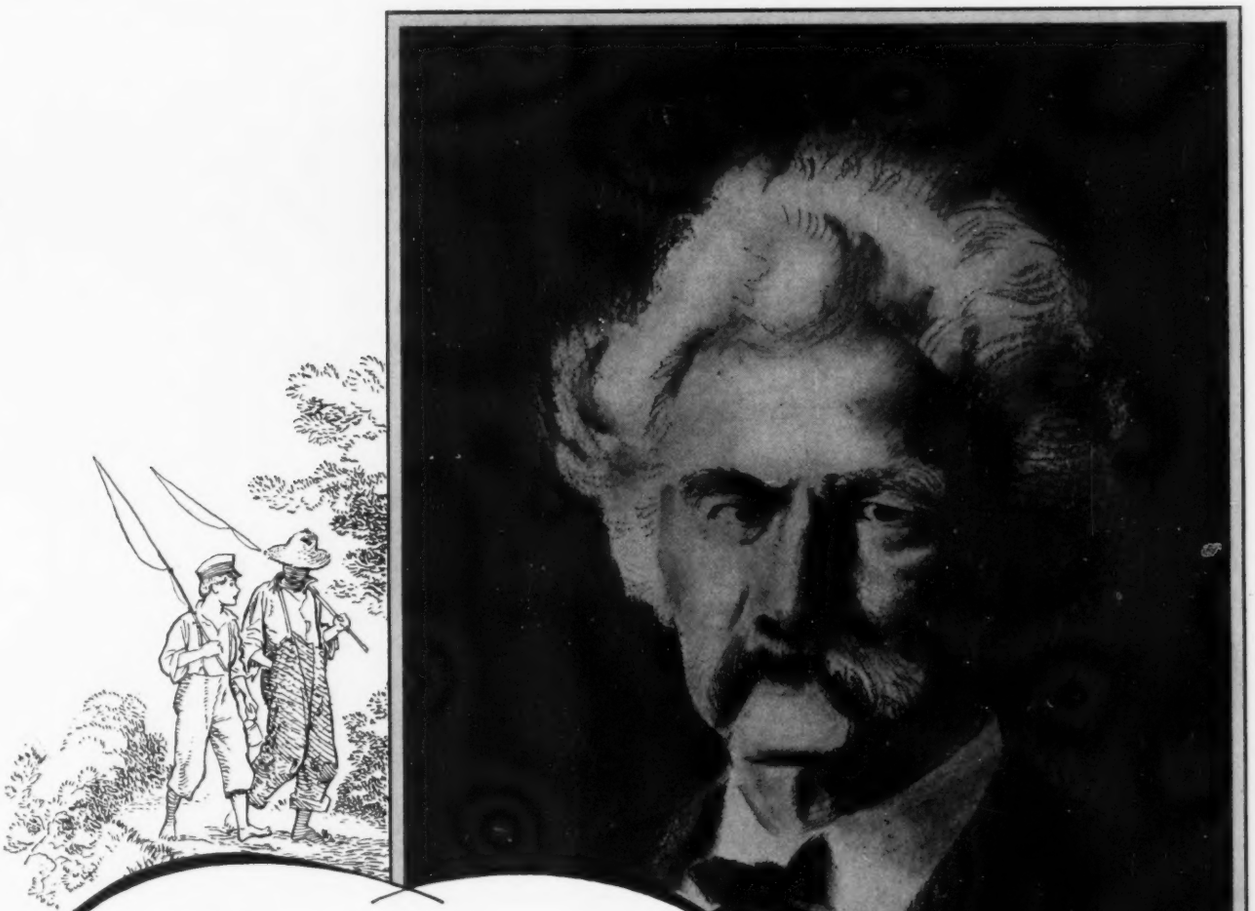
TAUNTON, MASS.—Municipal Light Department has announced reduced rates beginning March 1. A saving of $40,000 will result annually.

HUTCHINSON, MINN. — Northern States Power Company has asked the Supreme Court of the District of Columbia to prevent a $76,000 P.W.A. loan and grant for erection of a municipal electric plant. The company claimed its $135,000 investment would be destroyed.

CRYSTAL SPRINGS, MISS.—Transfer of the municipal light and water plants to the Mississippi Power & Light Company has been effected. The deal involved $300,000, to be paid over a period of years.

COLUMBUS GROVE, OHIO—The Board of Public Affairs, which controls the municipal light plant, played Santa Claus to its patrons when it sent receipted light bills to them for the payment of energy used during November. The board took the same action last year.

PORTLAND, ORE.—Two separate elections a year apart have been provided for by the City Council to determine if and on what basis the city shall acquire the properties of the Northwestern Electric Company at the expiration of its franchise November, 1937. At the first election, the time of the special state election January 31, 1936, the voters will be asked to express themselves yes or no on a proposal to levy a special tax of $50,000 to pay the expenses of appraisal of the company's properties looking toward a determination of how much of these properties might be purchased and at what price. If this proposal is voted in the affirmative, such investigation is to be carried out and the final proposal in definite terms will be placed before the people at a special election in February, 1937, with no other issue on the ballot. This action was taken by the Council early in December following four hearings at which proponents and opponents expressed themselves. The



Mark Twain Said....

"Everybody complains about the weather, but nobody does anything about it."

A true statement when it was made—but much *has* been done about the weather since the 19th century.

In 1936, we touch a switch, and like Aladdin's lamp, marvelous things are revealed to our eyes and ears. There is music, but no orchestra; news without the strain of reading; soft lights with no troublesome oils or wicks; heat without ashes; moving pictures of far off lands brought to our fireside, and conversations with friends at great distances without leaving our easy chair. Little matter that it storms, for we bring the world into our parlor.

The Utilities of our nation have made this possible by introducing into our homes, the prime mover, *Electricity*. A tremendous task when it is considered that distribution lines must continue to serve in the face of extreme weather conditions. In order to really "do something about the weather" it is necessary to build strong lines, supported on sturdy hardware.

The HARDWARE makes the line—
HUBBARD makes the Hardware

PITTSBURGH
CHICAGO

Hubbard and COMPANY

OAKLAND,
CAL.

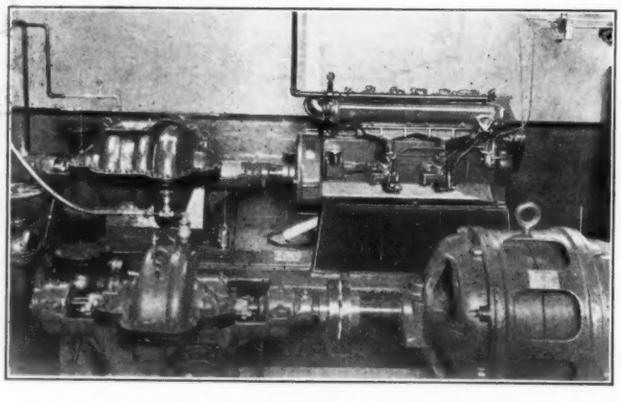
Safeguarding Public Institutions .. Hospitals .. City Water Supply .. Providing Power for Any Emergency

Consultation gratis, correct information on installations capably furnished.

STERLING HIGH DUTY INTERNAL COMBUSTION ENGINES

Sterling — THE ENGINE OF REFINEMENT

Gas—Gasoline—Diesel Oil Engines



At the Wassaic State School, Wassaic, N. Y., a Sterling Petrel 6 cylinder 125 H.P. engine direct connected to an American Well Works 5" 3 stage pump of 500 G.P.M. against a total head of 400' when running at 1350 R.P.M.

STERLING ENGINE COMPANY

Home Office and Plant:
1270 Niagara Street
Buffalo, N. Y.

Dept. C-2

Branch Office:
900 Chrysler Bldg.
New York, N. Y.

issue was forced largely by two councilmen known to be favorable to municipal ownership backed by the municipal ownership group in the city. The solution of the problem reached by the Council met little opposition from any source since it follows out a provision of the company's franchise that the city shall have the option to purchase the company's properties at a value to be arbitrated on the expiration of the franchise.

CHATTANOOGA, TENN.—City's suit attacking the franchise of the Tennessee Electric Power Company (ELECTRICAL WORLD, December 7, page 90) has been ordered transferred to the U. S. District Court. The utility's motion for the transfer was granted by Chancellor J. Lon Foust on the power company's plea that it was a non-resident corporation.

WICHITA FALLS, TEX.—Agitation for a municipally owned power and electric light plant has been settled finally by the defeat by vote of the taxpayers of the proposal to issue $1,260,000 of bonds which were to have been used as security for a loan of like sum by the P.W.A. In addition to this loan the P.W.A. had given an outright grant of $490,000 for the purpose (ELECTRICAL WORLD, December 7, page 90). The proposed pledging of net revenues of the city water system, together with revenues of the proposed power and light plant for the retirement of the bonds on a 30-year schedule at 4 per cent interest, was the factor at which opposition was aimed throughout the campaign.

•

Absolute System of Electrical Units

Substitution of the absolute system of electrical units for the international system will take place January 1, 1940, according to a decision of the International Committee of Weights and Measures. The following table gives a provisional list of the ratios of the international units to the corresponding practical absolute units, taken to the fourth decimal place:

1 Ampere Int'l	= 0.999 9 Ampere Absolute
1 Coulomb Int'l	= 0.999 9 Coulomb Absolute
1 Ohm Int'l	= 1.000 5 Ohm Absolute
1 Volt Int'l	= 1.000 4 Volt Absolute
1 Henry Int'l	= 1.000 5 Henry Absolute
1 Farad Int'l	= 0.999 5 Farad Absolute
1 Weber Int'l	= 1.000 4 Weber Absolute
1 Watt Int'l	= 1.000 3 Watt Absolute
1 Joule Int'l	= 1.000 3 Joule Absolute

•

To Eliminate Duplication in Government Statistics

With the approval of President Roosevelt, the Federal Power Commission, in co-operation with the Central Statistical Board, has taken the initiative in working out a plan for the elimination of duplication in the collection, compilation and publication of statistics relating to the electric light and power industry. The purpose is not only to promote uniformity but also to eliminate unnecessary expense for the federal government and for the private companies and municipal plants supplying such data.

Preliminary inquiry shows that there are eighteen federal agencies which collect and publish information relating to some phase of the electrical industry.

"WHY *are more and more manufacturers offering* MONEL METAL *work-tops on their ranges?*"

"Because Monel Metal is TROUBLE-PROOF!:

"Hot pots and pans don't affect it.

"It doesn't permanently stain.

"It has no coating to crack, chip, or peel off; it's solid through and through.

"It is an alloy of two-thirds Nickel and one-third copper, so it cannot rust.

"The bright gleaming appearance of Monel Metal is PERMANENT . . . in fact, improves with use. This is proved in the experience of hotels, ships, and trains where Monel Metal equipment after 20 to 25 years of service still looks as bright as the day it was installed, or brighter."

More and more the trend in modern kitchens is toward MONEL METAL work surfaces. This trend is furthered by advertising appearing throughout the nation on MONEL METAL sinks, counters, and ranges.

Be sure to have a representative selection of MONEL METAL-topped ranges on display. They always attract attention and start sales. And they will more than pay their way on your showroom floor.

MONEL METAL

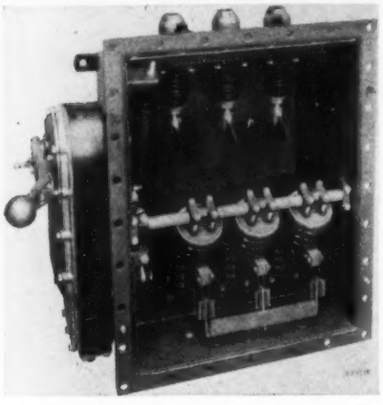
Monel Metal is a registered trade-mark applied to an alloy containing approximately two-thirds Nickel and one-third copper. Monel Metal is mined, smelted, refined, rolled and marketed solely by International Nickel.

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET, NEW YORK, N. Y.

NEW EQUIPMENT

Oil-Immersed Switch

Mounted directly on or in proximity to a transfer, this three-position, oil-immersed switch unit provides a means for sectionalizing from the line. It can be used in either network or radial systems. A locked-



Rated at 7.5 kv.; provision for padlocking to prevent unauthorized operation. **Delta-Star Electric Co.**, Chicago.

off position is provided for sectionalizing and cable grounding when men are working. The switch may be locked in all three positions by a mechanical interlock. Electrical interlock prevents switch operation if line and transformer are alive.

•

Fan-Cooled D.C. Motor

This new design provides a fan-cooled, totally inclosed d.c. motor with external fan and shroud on the commutator end. Same accessibility to armature and brushes as on straight totally inclosed motors is claimed. Since the blower is on the commutator end,

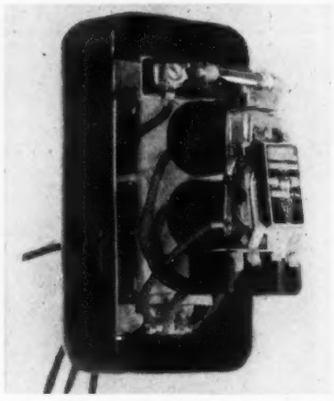
Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.

the motor can be mounted snugly against a gear case or other wall, thus conserving space. Removal of but one cover from a bracket opening permits accessibility to the brushes.

•

Automatic Recloser

This one-shot instantaneous relay is for attended, unattended or supervisory-controlled substations. It resets automatically if the breaker stays closed, or locks out if



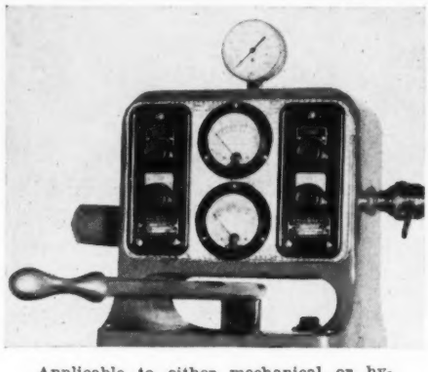
Type HG-18 — Intermediate between AC-1, a three-shot recloser, and HG-13, a one-shot manual reset relay. **General Electric Co.**, Schenectady, N. Y.

the breaker trips again within a few seconds. With the breaker in the closed position a capacitor charges from the battery circuit, through a resistance. Time required for accumulation of this charge determines the resetting time of the relay. When the breaker trips the capacitor discharges through the operating coil, closing the relay. The relay contact energizes its series holding coil and also the closing relay for the circuit breaker. An auxiliary switch on the breaker opens the circuit, allowing both relays to drop out. If the breaker remains closed the capacitor will recharge, if not the capacitor will not have sufficient charge to reclose the relay again.

•

Electrical Lathe Head

Central control of electrical and pressure systems of this make lathe is consolidated in this new electrical lathe head. Located directly before the operator it provides: (1) Push button control for all motors; (2) Pressure gages for either air or hydraulic pressure (for lathe with pressure cross-feed); (3) Direct-reading ammeters, telling the op-

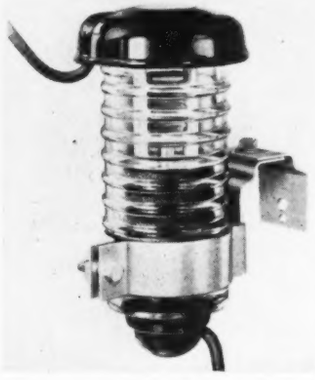


Applicable to either mechanical or hydraulic "Carbo-Lathe." **Porter-Cable Machine Co.**, Syracuse, N. Y.

erator the amount of power being consumed and enabling him to maintain best speed and feed for maximum efficiency. In addition ammeters warn operator of electrical trouble before it becomes serious, thus reducing repair costs.

Glass Body Lightning Arrester

Further development in the application of glass to lightning arrester design has enabled the production of an additional size type "C" arrester for medium high voltages.



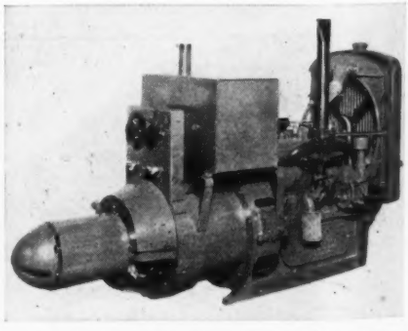
Type "C" arrester in "Pyrex" glass body available for 3,000 to 6,000-volt delta and 5,000 to 9,000-volt grounded "Y" systems. **Line Material Co.**, Milwaukee, Wis.

The new arrester has a longer body and moisture-proof sealed cap of "Pyrex" glass and is furnished with a generous supply of "Granulon" valve material.

•

Gasoline Driven Welder

No external reactance or stabilizer is required for this single-operator, variable-voltage type welder, known as the "200-Ampere Shield Arc Special." Dual welding



Welding current range 60 to 250 amp.; total weight 1,078 lb.; uses base or heavily coated electrodes up to ¼ in. **Lincoln Electric Company**, Cleveland, Ohio.

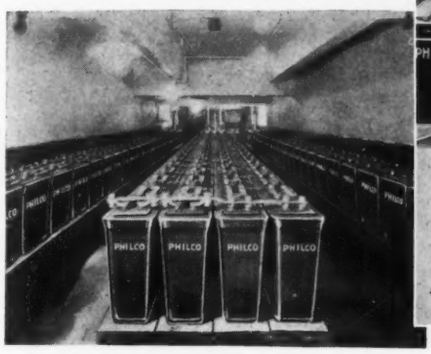
current control is provided by adjusting both series and shunt fields. Separate excitation of generator shunt fields is by means of an exciter mounted on the generator end of the unit. Power supplied from direct-connected 23-hp., four-cylinder, Waukesha engine.

•

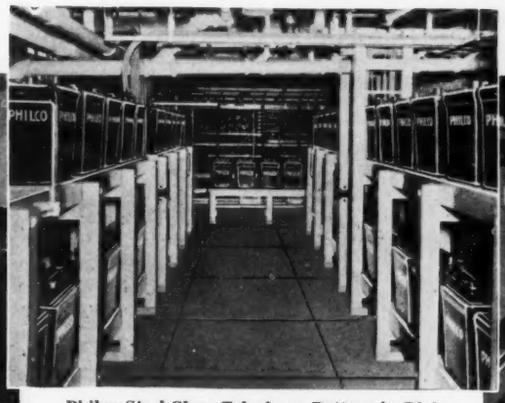
Pumping Unit

Designed especially for hotwell service and for handling liquids near their vapor pressures, this "Monobloc" pump finds application in power plants, refineries and also

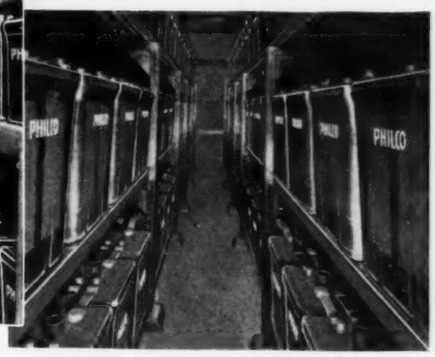
PHILCO PHILCO



Two Philco Steel-Glass Power Battery
A—Control—240 V—896 A.H.
B—Emergency Lighting 240 V—368 A.H.



Philco Steel-Glass Telephone Battery in Dial Central Office—48 V—1600 A.H.



Steel-Glass Battery for Starting and Auxiliary Power in Diesel Generating Plant. 230 V—1318 A.H.

FLOTÉ in STEEL-GLASS

For more Reliable Control and Auxiliary Power

Floté in Steel-Glass
Type 23FF
1056 A.H. Capacity

Floté in Steel-Glass will give you a battery of non-varying maximum capacity in full float operation. It will give you also a battery with a life factor decidedly superior to that of the conventional battery not specifically designed for floating service. Floté in Steel-Glass will effect substantial savings in maintenance and minimize repair costs.

The combination of Floté plates, monobloc, wedged-in-place elements and dual insulation guarantees the utmost in battery service and economy—and we will gladly undertake to prove this statement.

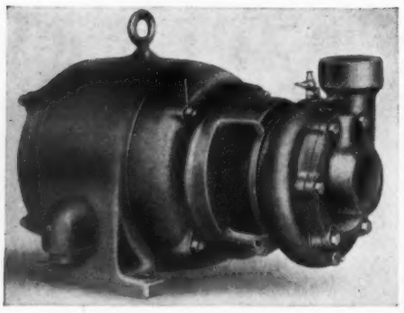
Floté in Steel-Glass is a new, different, improved type of battery—developed especially for full float operation. Let us tell you more about it—show you facts and figures—show how you can further lower your battery costs. Ask for the new catalog No. 1255 containing complete information.

PHILCO, BATTERY DIVISION
PHILADELPHIA

BOSTON	ATLANTA	SAN FRANCISCO
NEW YORK	CHICAGO	LOS ANGELES
CLEVELAND	ST. LOUIS	PORTLAND
PITTSBURGH	KANSAS CITY	SEATTLE

LISTEN TO BOAKE CARTER OVER KEY COLUMBIA STATIONS

PHILCO *Power for Everything!*



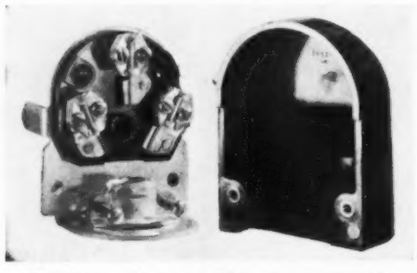
Capacity range 10 g.p.m., 50 to 110-ft. head, 12-in. submergence up to 175 g.p.m.; 50 to 70-ft. head 60-in. submergence. **Worthington Pump and Machinery Corporation,** Harrison, N. J.

in industrial plants for handling volatile liquids against medium heads. Features of the design include removable suction head, rugged casing requiring no base plate, and shaft sleeve integral with impeller hub to give greater rigidity. Pumps are bronze fitted, all iron, all bronze or of special materials with splashproof, air-jacketed, or explosion-resisting motors.

•

Range Cap

Simpler, safer and quicker installations of electric ranges are said to be possible with this molded, plastic range cap which features a shock-proof housing and internal plate. The molded material used, "Durez"



Provided with facilities for armored cable connection. **Arrow-Hart & Hegeman Electric Co.,** Hartford Conn.

(General Plastics, North Tonawanda, N. Y.), is heat resisting and will not lose dielectric strength from exposure to high temperature.

•

Multiple Fuse

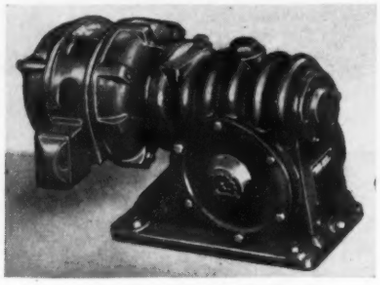
When this fuse is blown it may be renewed by turning the knob on the fuse to the right, thus engaging a new fuse link. The fuse remains in the socket until it has

"Indicator-6-Fuse." **Indicator Corporation,** Newark, N. J.

been blown six times. In addition to the renewable feature each fuse is equipped with a minute neon tube which glows when the fuse fails, indicating which of a number of fuses has operated.

Gear Motors

Helical and worm gear drives of either the direct-connected or coupled type, in single, double and triple reductions for horizontal, vertical or right-angle drive make up this



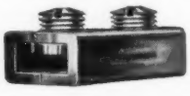
"IXL" helical gear motors, ¾ to 75 hp., speeds down to 6 r.p.m. with 1,750-r.p.m. motor; "IXL" worm gear motors (shown), ¾ to 40 hp., speeds down to 30 r.p.m. **Diehl Manufacturing Co.,** Elizabethport, N. J.

new line of gear motors and speed reducers. Motors on the double and triple reduction units are supported on the gear case, which is constructed to handle the heavy torque loads of the slow-speed shaft.

•

Solderless Connector

Bronze fixture type connector for outdoor work will hold two No. 12 or three No. 14 wires in either end. **H. B. Sherman Mfg. Co.,** Battle Creek, Mich.

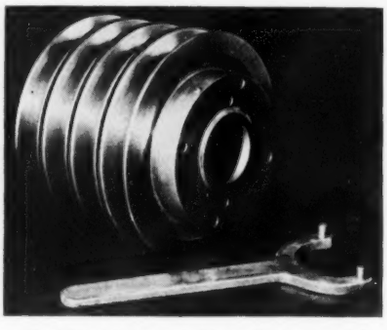


Made in the same design as the Sherman brass fixture connector, this companion bronze unit is intended especially for outdoor work, such as neon sign connections. All parts of the new connector are made of high copper bronze, said to give positive insurance against weather cracking even under most severe climatic conditions.

•

Vari-Pitch Sheave

A simple adjustment which takes but a few moments will change the pitch diameter of this sheave to give variations in speed as high as 15 to 25 per cent per sheave. If both sheaves of a drive of this type are



"Vari-Pitch Texrope Sheave": two multi-groove types; stationary where occasional speed changes are required, motion controlled where frequent quick speed changes are necessary. **Allis-Chalmers Mfg. Co.,** Milwaukee, Wis.

changed the variation can be doubled. This new sheave, which uses texrope belts, is especially desirable for drives formerly employing several sets of sheaves to meet occasional changes in speed.

ENGINEERING DATA FROM MANUFACTURERS

Bulletins and catalogs now available to engineers by manufacturers and associations

A 20-page booklet, available from Latrobe Electric Steel Company, 40 W. 40th St., New York, describes, with photomicrographs, the manufacture, application, characteristics and heat treatment of "duo-metals." These are comparatively cheap ferrous products clad with the expensive iron alloys, nickel or stellite by a recently developed electrochemical process. They are used in tools, dies and chemical equipment.

Economies effected by the use of rubber tires on industrial trucks and cars are outlined and typical applications illustrated in a 24-page handbook announced by B. F. Goodrich Co., Akron, Ohio. Dimensions and capacities of various available shapes are tabulated.

Problems in the Application of Electricity in the Home and on the Farm (35-pages) contains in question and answer form essential and fundamental information on electricity, electrical terms, electrical wiring supplies, materials and methods. This bulletin was developed by the Pennsylvania Joint Committee on Rural Electrification, Harrisburg, Pa., to aid in training farm boys and girls in the characteristics of electricity and applications of electricity. Copies may be obtained from the committee at 20 cents each or 15 cents in lots of five or more.

Materials For Low Cost Farm Lines is a 28-page bulletin (No. 513-H) of the Ohio Brass Company, Mansfield, Ohio, devoted to typical rural line construction arrangements using various types of pole line insulators and hardware. A portion of the book is devoted to illustrating and listing with specifications a line of rural line construction materials.

An extensive line of insulators, hardware and line materials is listed in a recent 70-page handbook of Victor Insulators Inc., Victor, N. Y. Detail drawings, dimensions and specification tables describe each device.

In addition to listing and describing a line of electrical maintenance equipment, catalogue H-535 of the Ideal Commutator Dresser Co., Sycamore, Ill., contains much up-to-date information on commutator and motor maintenance. A number of pages of useful tables, formulas and definitions are included—which should be of definite value to electrical maintenance men.

Function, assembly and operation of crystal valve lightning arresters are covered in a 10-page illustrated booklet obtainable from Electric Service Supplies Company, Seventeenth and Cambria Streets, Philadelphia, Pa.

Bulletin No. 1259 of Allis-Chalmers Manufacturing Company, Milwaukee, Wis., presents in 32 pages a pictorial story of the application of texrope drives in industry. Sectional drawings are used to show refinements in sheave design.

Technical details of the design and construction of the new Bristol wide strip pyrometer are listed and illustrated with wiring diagrams and isometric drawings in a 36-page bulletin of the Bristol Company, Waterbury, Conn.

Ratings and capacities of pot and trough types of electric furnaces are given in leaflet 20 of the Harold E. Trent Company, 618 N. 54th Street, Philadelphia. This company has also released leaflet TC 30, which tabulates the ratings and specifications of its complete line of heating elements and heating units.

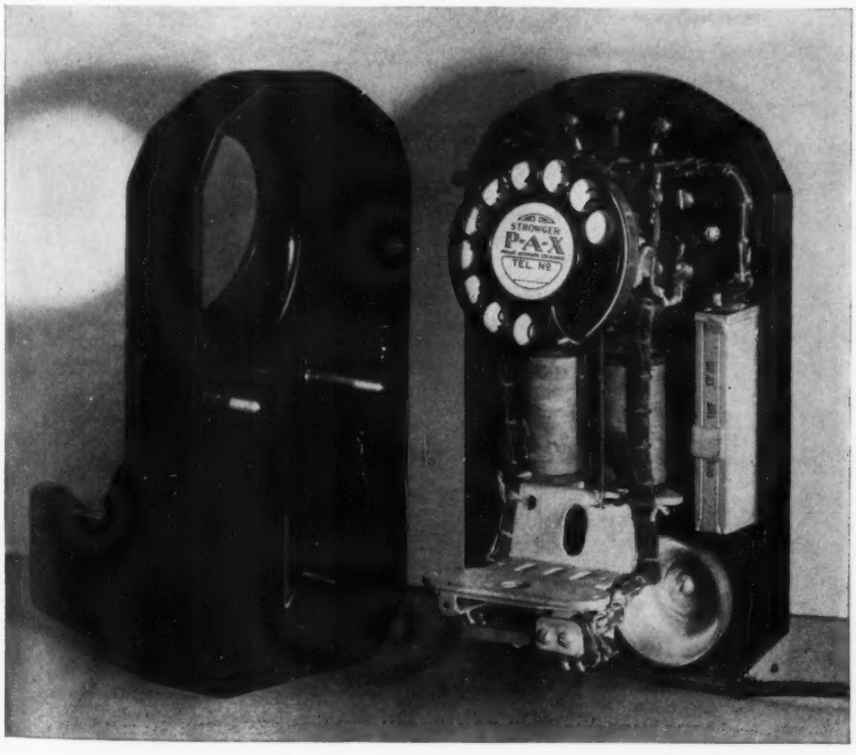
★

This Modern Monophone emphasizes the Manifold Advantages of Bakelite Molded

EACH new application of Bakelite Molded is apt to reveal special functions which can be performed more efficiently. The improved Monophone Wall-Mounting Telephone provides an excellent example. Through use of modern Bakelite Molded to form the hand-set housing and wall box, this product gained advantages, not only in design, production and assembly, but in installation as well!

Because of the unusual adaptability and strength of Bakelite Molded, it was practical to design the wall box for two-piece construction. It is completely formed in two press operations, with all necessary grooves, recesses and through-holes incorporated, and with metal inserts firmly and accurately positioned. Machining is unnecessary, and the rich, permanent lustre of the material eliminates finishing and polishing operations.

In the same press operation, an important installation problem also is satisfactorily solved by Bakelite Molded. Due to varying conditions of service, an option in the positioning of through-holes for wall-fastening screws must be provided.



To avoid superfluous openings, numerous holes with thin, self-contained closures are molded in the base of the box. As required for mounting, these closures may be readily "knocked out".

The production of the 3-piece hand-set in Bakelite Molded provides similar benefits. These same advantages of Bakelite Molded, and many others made possible by its unusual physical, electrical, chemical and thermal properties, are today effecting substantial improvements and economies in the design and production of hundreds of different appliances, devices and products in both the mechanical and electrical industries.

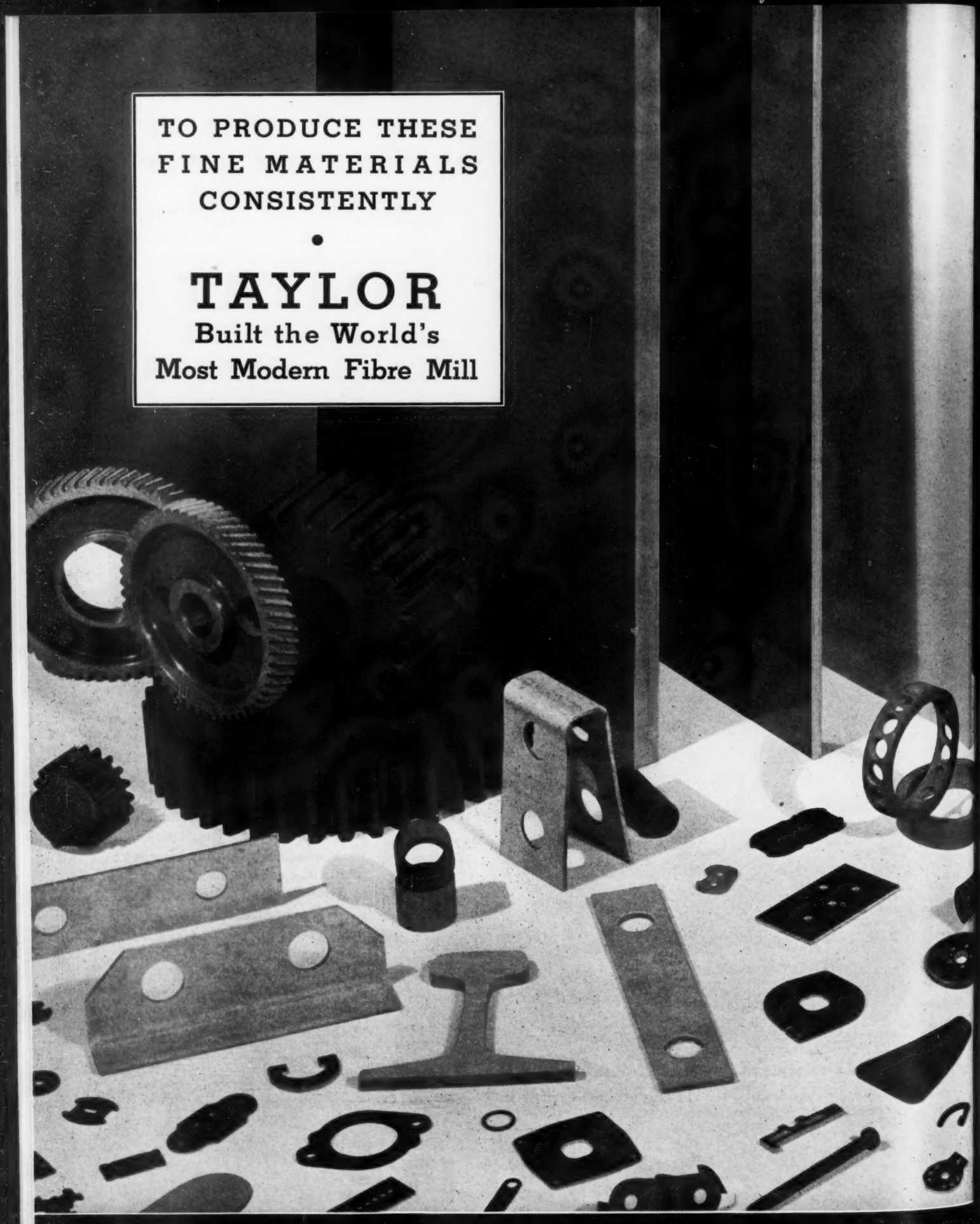
For further information and examples of present-day applications, write for illustrated booklet 3M, "Bakelite Molded". You will be interested also in 3L, "Bakelite Laminated".

BAKELITE CORPORATION, 247 Park Avenue, New York, N.Y. . . . . 43 East Ohio Street, Chicago, Ill.
BAKELITE CORPORATION OF CANADA, LIMITED, 163 Dufferin Street, Toronto, Ontario, Canada

BAKELITE
REGISTERED U.S. PAT. OFF.

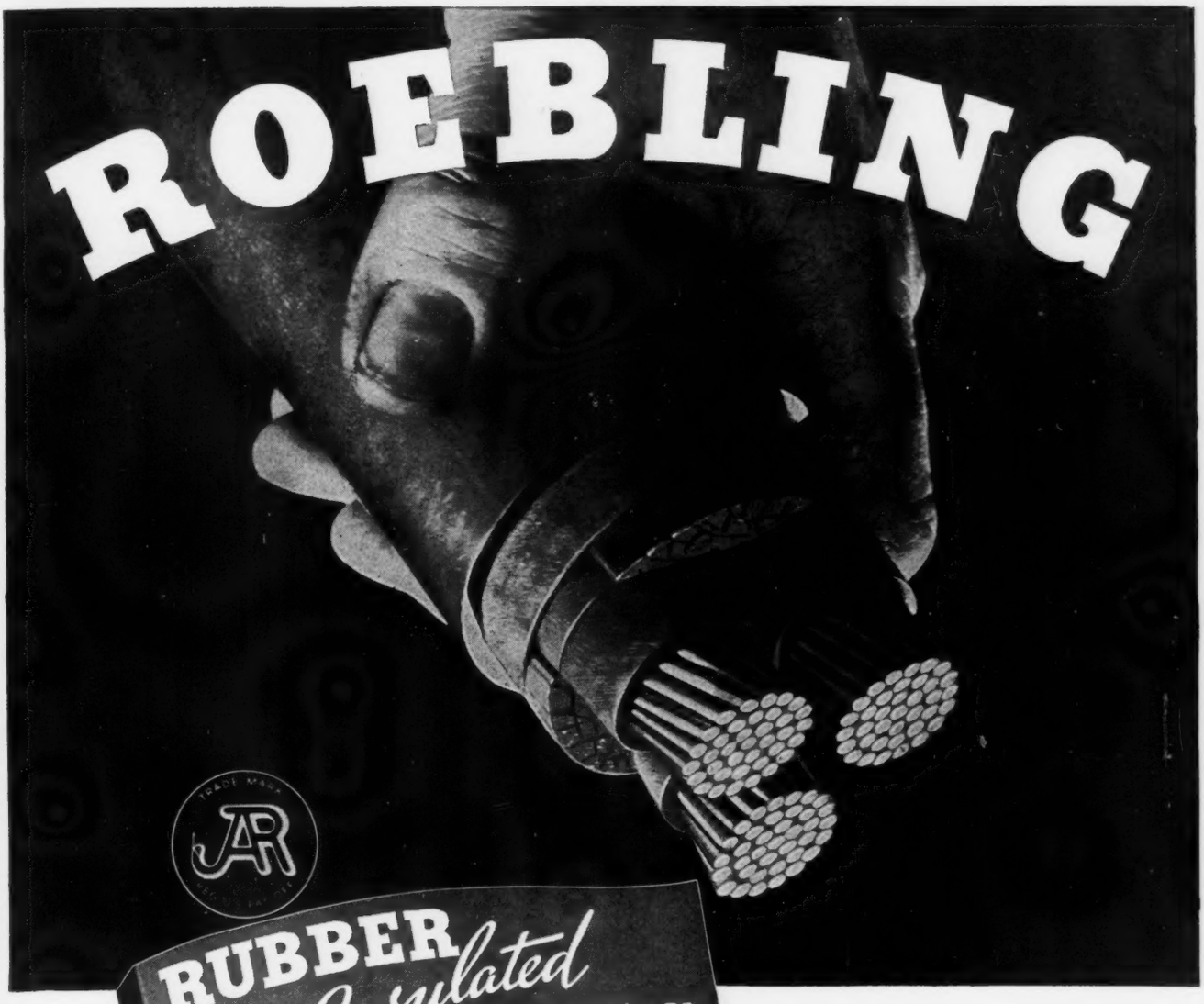
"The registered trade marks above above distinguish materials manufactured by Bakelite Corporation. Under the capital "B" in the numerical sign for infinity, or unlimited quantity, it symbolizes the infinite number of present and future uses of Bakelite Corporation's products"

THE MATERIAL OF A THOUSAND USES


TO PRODUCE THESE
FINE MATERIALS
CONSISTENTLY
•
TAYLOR
Built the World's
Most Modern Fibre Mill

TAYLOR

ROEBLING



RUBBER *Insulated* CABLES

For power transmission, railway signaling, building wiring, and many other purposes, Roebling Rubber Insulated Wire and Cable are available.

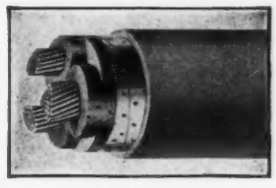
Plain Rubber 60% Sheath Power Cable. "SAFECOTE" Rubber-insulated and Braided Wires and Cables: Code, Intermediate, 30% and 40% Performance, 35% and 40% Performite. 40% and 60% Sheath Flexible Cords. Parkway, Service, Mining, Welding, and Control Cables; Tree Wire.

These will give you a fair idea of the completeness of the Roebling Line. They are made in a wide range of sizes and voltages. Armors:—steel, zinc, or bronze tape, or round steel wire.

MANY OTHER TYPES

Power Cables: Paper; Cambric; Rubber » Station Cables » Slow Burning Wires and Cables » Weatherproof Wires and Cables » Submarine Cables » Portable Cords » Fixture Wire » Magnet Wire » And a wide variety of other wires and cables.

JOHN A. ROEBLING'S SONS COMPANY
TRENTON, N. J. *Branches in Principal Cities*



Roebling Paper Insulated Cable.

Roebling Varnished Cambric Insulated Cable.

ONLY A FINE PRODUCT MAY BEAR THE NAME ROEBLING

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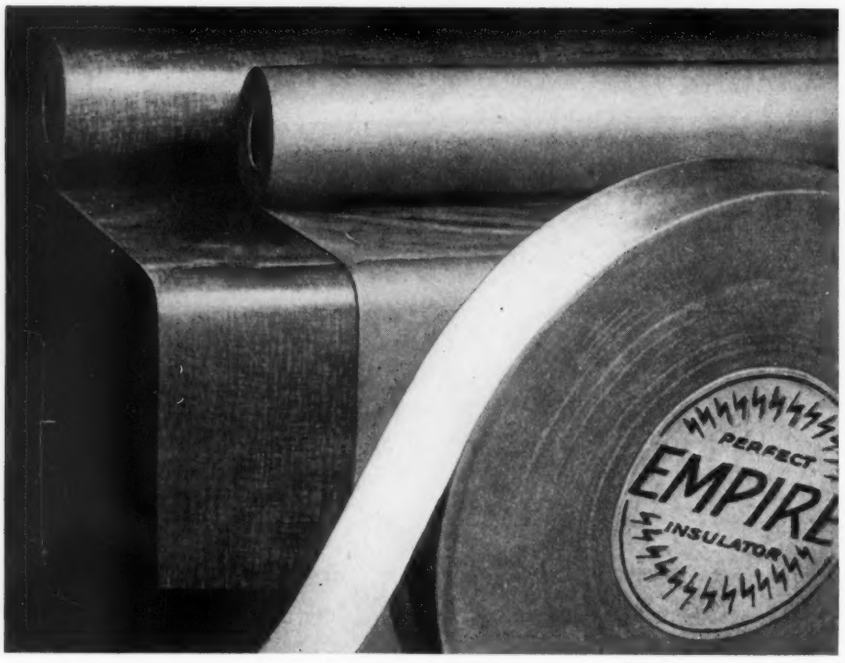
. . . THIS VARNISHED CAMBRIC MEETS THEM ALL!



1. Dielectric strength; 2. Tensile breaking strength; 3. Elongation; 4. Pliability; 5. Finish; 6. Uniformity; 7. Resistance to aging; 8. Resistance to the severe conditions encountered in making joints and splices. Under *all* these specifications exacting requirements are met by Empire Varnished Cloth and Tape. To an unusual degree you can obtain in these insulations almost any combination of characteristics desired.

This exceptional all-around high quality of Empire Cloths and Tapes has led to their use by many power companies and electrical manufacturers whose specifications are extremely severe.

We are always ready and anxious to have our Varnished Cloths and Tapes subjected to exacting tests and will gladly furnish samples for test purposes. These products are available in yellow or black, straight or seamless bias cut, in tape form or in full width materials.

Mica Insulator Company

200 Varick Street, New York; 542 So. Dearborn St., Chicago; 1276 W. 3rd St., Cleveland. *Branches at* Birmingham, Boston, Cincinnati, Los Angeles, San Francisco, Seattle. *Canada:* Montreal, Toronto.

Recent Rate Changes

Nebraska Railway Commission has called for public hearing early this year all of the private and public power corporations serving rural electrical subscribers for a discussion of rural electric rates, services and regulations. For several years the question has been debated as to whether the railway commission had any authority over rural electric rates. On hearing before the Nebraska Supreme Court it was ruled that the commission could call a hearing with reference to rates and determine what are reasonable rates for the furnishing of electric energy to rural users.

•

South Carolina Power Company has announced reductions in its electric power and gas rates, totaling $282,000 annually, effective January 1. The order was adopted December 18 by the state Public Service Commission and agreed to by officials of the company. Under the order, customers of the company will benefit by an immediate reduction amounting to $173,000 and under the "objective" rates a possible additional saving of $109,000 will be effected. The order further provides that the commission shall continue "to have the right" from time to time "to investigate and revise the rate schedules of the said company, or to investigate and appraise its said property and revenues, as in the judgment of the said commission the public interest may require."

•

South Carolina Public Service Commission recently held a hearing on a rule for the Duke Power Company to show cause why it should not provide energy to the rural electrification authority of South Carolina at a rate ranging from 9 mills to 1½ cents per kilowatt-hour. The commission made no decision, but merely took the testimony into consideration. Representatives of the power company contended that the proposed rate was discriminatory and unfair, while the engineers for the electrical utilities division of the commission declared that the rate was reasonable and was low enough to induce rural customers to buy the service.

•

Public Service Company of Colorado, effective December 15, reduced its electric rates in the San Luis Valley and Alamosa, Colo., making a saving to consumers of approximately $24,000 annually.

•

Northwestern Public Service Company, through C. J. Strike of Huron, vice-president and manager, has protested the flat 2-cent-per-kilowatt-hour reduction demanded by the South Dakota Electric Corporation, recently organized by Gov. Tom Berry. Mr. Strike charges the new corporation with "an endeavor to poison the minds of the public by inferences which do not reflect true conditions."

•

Northern States Power Company, whose rate structure is being investigated by the Wisconsin Public Service Commission, claimed that its properties are valued at $9,000,000 more than the figure set by the commission's engineering staff. Arthur H. Kuhn, Chicago, assistant valuation engineer of the Byllesby Engineering & Management Corporation, of which Northern States Power is a subsidiary, presented the figures at a hearing being conducted by the commission. The valuation of the utility's property was fixed by Mr. Kuhn at $22,331,806, compared with $17,739,650 claimed by the commission's engineers. The company has announced reduced electric rates, effective January 1, which will save consumers in Sioux Falls, S. D., $35,000 annually. A

Current Transformers with *New* Secondary Terminal Blocks

ALLIS-CHALMERS Current Transformers for Metering service are equipped with a new Molded Secondary Terminal Block which has the following features:—

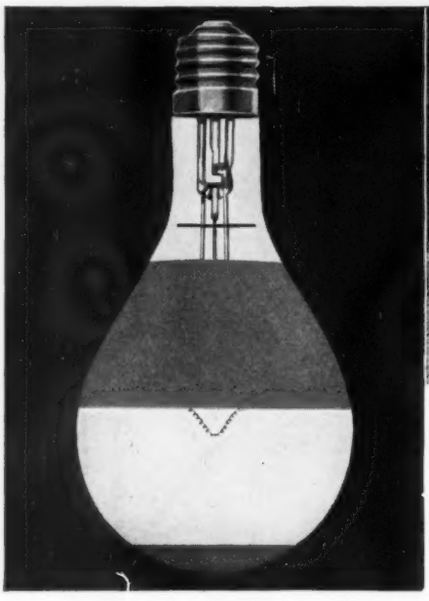
1. All conducting parts are embedded in molded phenolic insulation to obtain maximum reliability.
2. Short-circuiting strap is manually operated—there are no spring contacts or automatic devices to misoperate and affect meter readings.
3. Cover is foolproof—cannot be seated in position while secondary is short-circuited.
4. Cover may be removed without disturbing electrical connections.
5. Separate terminals are provided for meter connections, thus eliminating danger of loosening connections to the winding.
6. Terminals are of ample size to accommodate the largest secondary meter cable normally used.
7. Location of block, snug fitting cable openings, and sealable wing nuts on cover, all combine to discourage tampering.

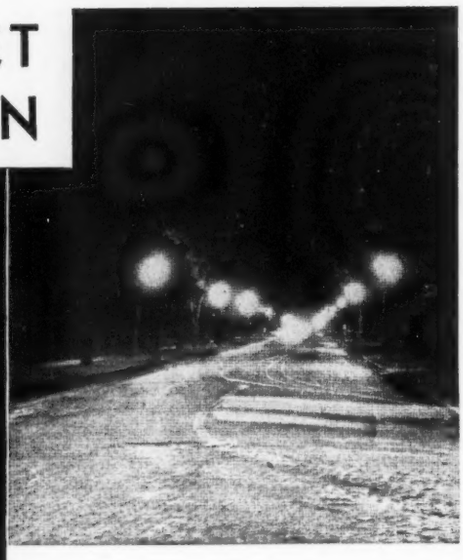
Allis-Chalmers manufactures a complete line of current and potential transformers for all voltages as well as combined potential and current transformers or metering outfits. They incorporate the same high standards of engineering and construction which characterize Allis-Chalmers distribution and power transformers and are built in strict accordance with the standards of the A.I.E.E. and N.E.M.A.

ALLIS-CHALMERS

— Allis-Chalmers Manufacturing Company, Milwaukee, Wisconsin, U.S.A. —

Better STREET ILLUMINATION



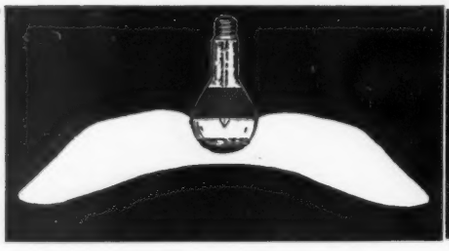


. . . means a more satisfied public—and an increased commercial load

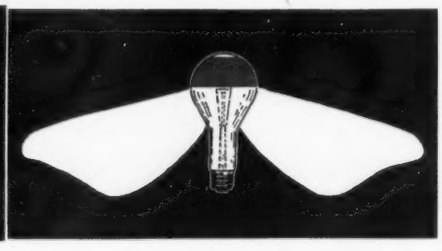
Silvray "Multiplex" Processing enables the Utility to offer Municipalities a proven plan, designed to increase *effective* illumination, from present equipment, 30% to 50% (at an annual cost about equal to that of present lamp renewals). The economies thus effected on existing lights, encourage the placing of additional lights in poorly illuminated sections throughout the city. Result: *a better satisfied public; Civic Authorities and the public "sold" on the Utility; a built up street lighting load.*

Write for details, or have one of our Engineers call with reference to a Survey or Recommendations. There is no obligation.

SILVRAY "MULTIPLEX" PROCESSING



Silvray "Multiplex" B.U.S. Processing. Wide Range Symmetric Distribution. Base Up-Burning Position.



Silvray "Multiplex" B.D.C. Processing. Any Range Symmetric Distribution. Base Down-Burning Position.

AMERICAN STREET ILLUMINATING COMPANY

"Backed by 58 Years' Street Lighting Experience"

261 NORTH BROAD STREET . . PHILADELPHIA, PA.

reduction in commercial lighting rates at Montevideo, Minn., will save consumers $4,200 annually.

•

Orange & Rockland Electric Company has filed with the New York Public Service Commission revisions of its electric rate schedules which change the plan for the extension of rural electric lines and which also make changes in the residential and commercial rates of the company. The commission permitted the revised rates to become effective December 18 without approval or disapproval. The revision in the line extension plan is estimated to save rural consumers on line extensions about $3,000 annually. The changes in the residential rates will mean net decreases amounting to about $9,000 of which about $5,000 will be saved by residential consumers in Tuxedo Park and about $4,000 by residential users in the other parts of the company's territory. The changes in the commercial rate will save consumers about $250 a year.

•

Buckeye Light & Power Company has been authorized by the Ohio Public Utilities Commission to file new schedules for domestic use at Covington, Ohio. The authorization was granted on the basis of an ordinance passed November 18 and accepted by the company on November 23. The new schedule is: First 40 kw.-hr. per month, 7 cents; excess, 3 cents; minimum, 60 cents for 2 kw.-hr. or less, with each addition at 50 cents. The present rates are: First 25 kw.-hr., 10 cents; next 20, 9 cents; next, 20, 8 cents; next 20, 7 cents; excess, 6 cents; minimum, 75 cents.

•

New York Power & Light Corporation has filed with the Public Service Commission revisions of rates in its Saratoga and Glens Falls districts which are estimated to save consumers about $74,270 annually.

•

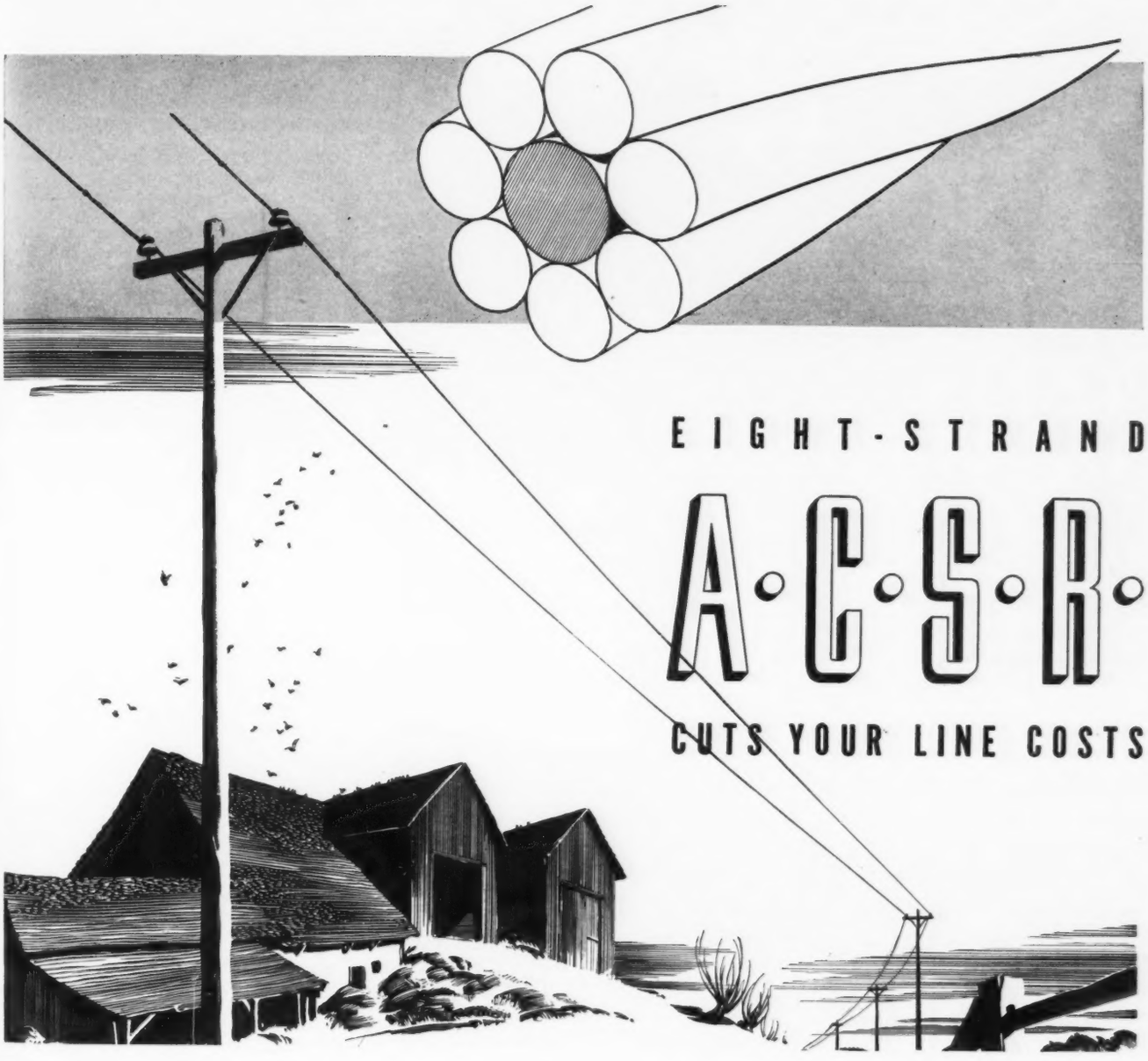
Los Angeles Board of Water and Power Commissioners has announced that electric service rate reductions calculated to save consumers $1,627,000 a year will become effective early this year. The date of the new schedule has been fixed as of February 1, 1936, to allow for publication of the new rate ordinance thirty days prior to its effective date, as required by law. Reductions included in the total represent a cut of 10 per cent in the anticipated gross annual revenues of approximately $16,350,000 for the fiscal year ending June 30, 1936, according to the board. The total includes a flat 10 per cent cut of $154,000 in street-lighting service; a reduction of $446,000 per year for all classes of residential and domestic users of energy, and a reduction of $1,007,000 a year for general lighting and power, including commercial, governmental and industrial services.

•

Empire Gas & Electric Company's new rate schedule, calling for a reduction estimated at $82,000 annually, has been approved by the New York Public Service Commission. This reduction is in addition to a reduction made effective last March which saved consumers $116,000.

•

Arizona Power Company, just emerging from receivership, has been ordered by the state Corporation Commission to make a 2-cent reduction in the top bracket of residential and commercial rates at Prescott and vicinity—from 14 cents to 12 cents per kilowatt-hour. The new rate set-up will be effective until January, 1937, at which time a schedule—already accepted by the commission—will afford further reductions of from 25 to 35 per cent.



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A·C·S·R·

CUTS YOUR LINE COSTS

● Eight-Strand A. C. S. R. is 25% stronger. The increased strength-weight ratio permits you to lengthen spans and to cut costs, radically, without stressing the conductor beyond the safe limits dictated by long experience.

A. C. S. R., in fundamental principle, represents the most perfect combination of strength, conductivity, and lightweight. The new stranding (seven Aluminum over one steel) simply steps this time-tried principle forward into new levels of economical performance.

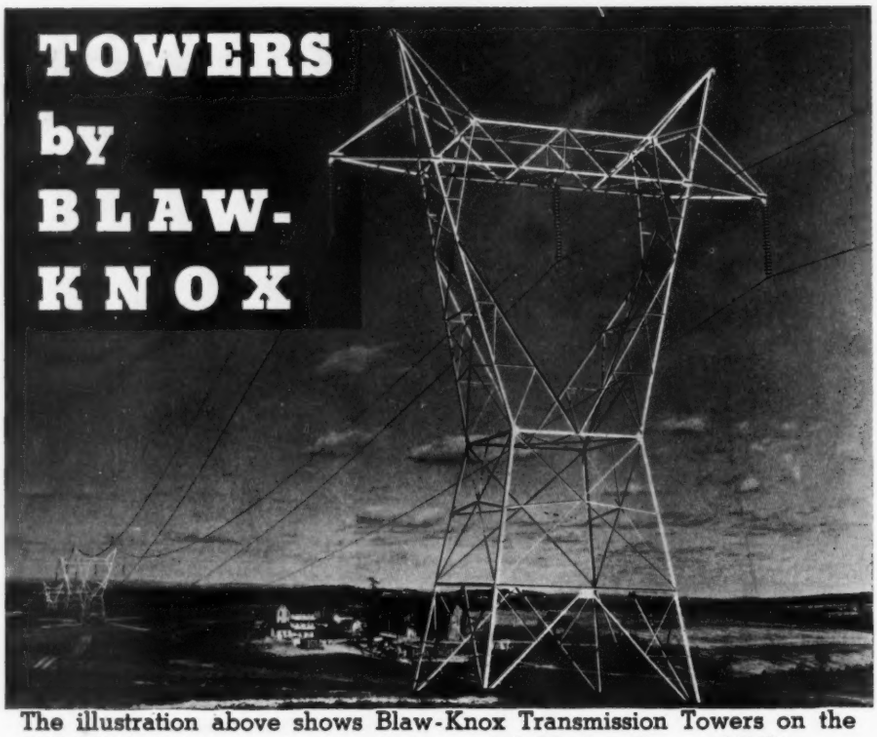
8-strand A. C. S. R. uses the same fittings as equivalent 7-strand! Both conductors may be used on the same system without duplication of storeroom stocks.

For maximum reliability and protection against vibration fatigue, abrasion, and flashover burns, use armor rods. They are particularly desirable for substandard lines.

Our usual complete data are available. Send for them now. ALUMINUM COMPANY OF AMERICA, 2138 Gulf Building, Pittsburgh, Pa.

ALCOA ALUMINUM

TOWERS by BLAW-KNOX



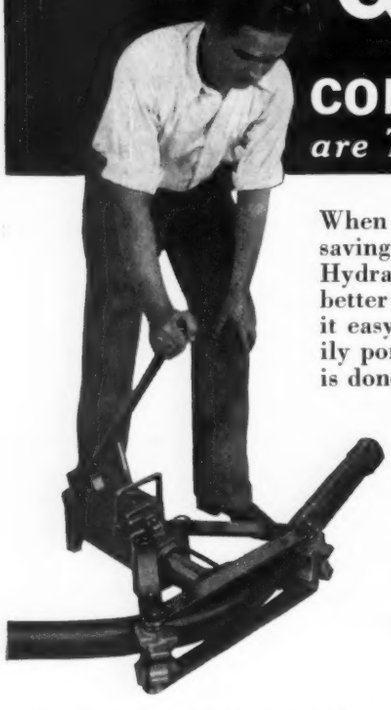
The illustration above shows Blaw-Knox Transmission Towers on the 220,000 volt transmission line between Safe Harbor, Pa., and Baltimore, Md., built by the Pennsylvania Water & Power Company of Baltimore.

BLAW-KNOX COMPANY
2013 FARMERS BANK BUILDING, PITTSBURGH, PA.

BLAW KNOX COMPANY SERVES THE PUBLIC UTILITIES WITH: Transmission Towers—Malone Anchors—Standard Steel Buildings—Electroforged Steel Grating—Gas Cleaners—Steel Forms—Tracyfiers—Dust Collectors—Steel Storage Bins—Clamshell Buckets.

GREENLEE

Hydraulic
CONDUIT BENDERS
are Time and Money Savers



When conduit or pipe must be bent, large savings can be made by using a Greenlee Hydraulic Bender. It will do it faster and better than by other methods and will make it easy to pull in wire and cable. It is readily portable and simple to operate. Bending is done by hydraulic pressure, which forces a shoe against the conduit while being held at two points by formed support castings. Two sizes are made for rigid conduit. No. 770 bends sizes 1¼" to 3", and No. 775 bends 2½" to 4½". Thin-wall steel conduit is bent by fitting the No. 770 with attachments for that purpose. A full 90-degree bend can then be made with one complete forward movement of the ram.

Above is a piece of rigid conduit being bent with a Greenlee Hydraulic Bender. It makes smooth even bends and is easy to operate, even when handling the larger sizes of conduit.

Write NOW for Complete Details

GREENLEE TOOL CO.
1705 Columbia Ave. Rockford, Ill.

SALES OPPORTUNITIES IN NEW CONSTRUCTION

SPRINGFIELD, NEB.—Nebraska Power Company, Omaha, Neb., plans transmission and distribution lines at Springfield, Washington and vicinity for rural electrification in that district, including power substation and service facilities. Permission has been secured.

GRAND RAPIDS, MICH.—Fisher Body Corporation, Detroit, Mich., a subsidiary of General Motors Corporation, same address, plans installation of power substation facilities, motors and controls, regulators, conveyors, electric hoists and other equipment in new multi-unit plant for steel stamping and die manufacture at Grand Rapids. Cost over $5,000,000.

KNOXVILLE, TENN.—Director of Purchase, Tennessee Valley Authority, receives bids until January 8 for 2,300-volt switching equipment for Wheeler hydroelectric power plant.

NEW ORLEANS, LA.—Johns-Manville Corporation, New York, N. Y., plans installation of motors and controls, power substation equipment, conveyors, etc., in new multi-unit plant in Jefferson Parish, near New Orleans, where tract of 60 acres of land has been purchased, for manufacture of roofing materials, asphalt paints and kindred products. Cost about $700,000.

MARSHALL, MO.—Has secured Federal aid in amount of $158,545 for extensions and improvements in city-owned power plant, and will proceed with work at early date, including installation of new prime movers and auxiliary equipment. Henrici-Lowry Engineering Company, West Tenth Street Building, Kansas City, Mo., is consulting engineer.

CLEVELAND, OHIO—Department of Public Utilities, Division of Light and Power, plans new ornamental street-lighting system on portion of Ontario Street, including standards, cable lines, transformers and auxiliary equipment.

PORTLAND, ORE.—United States Engineer Office, Second District, receives bids until January 21 for six 16,000-kva., single-phase transformers; three 1,667-kva., single-phase transformers; and two 1,000-kva., three-phase transformers (Circular 180).

PUTNEY, KY.—Intermountain Lumber Company plans installation of motors and controls, conveyors, loaders, etc., in connection with proposed rebuilding of mill, recently destroyed by fire. Loss over $125,000.

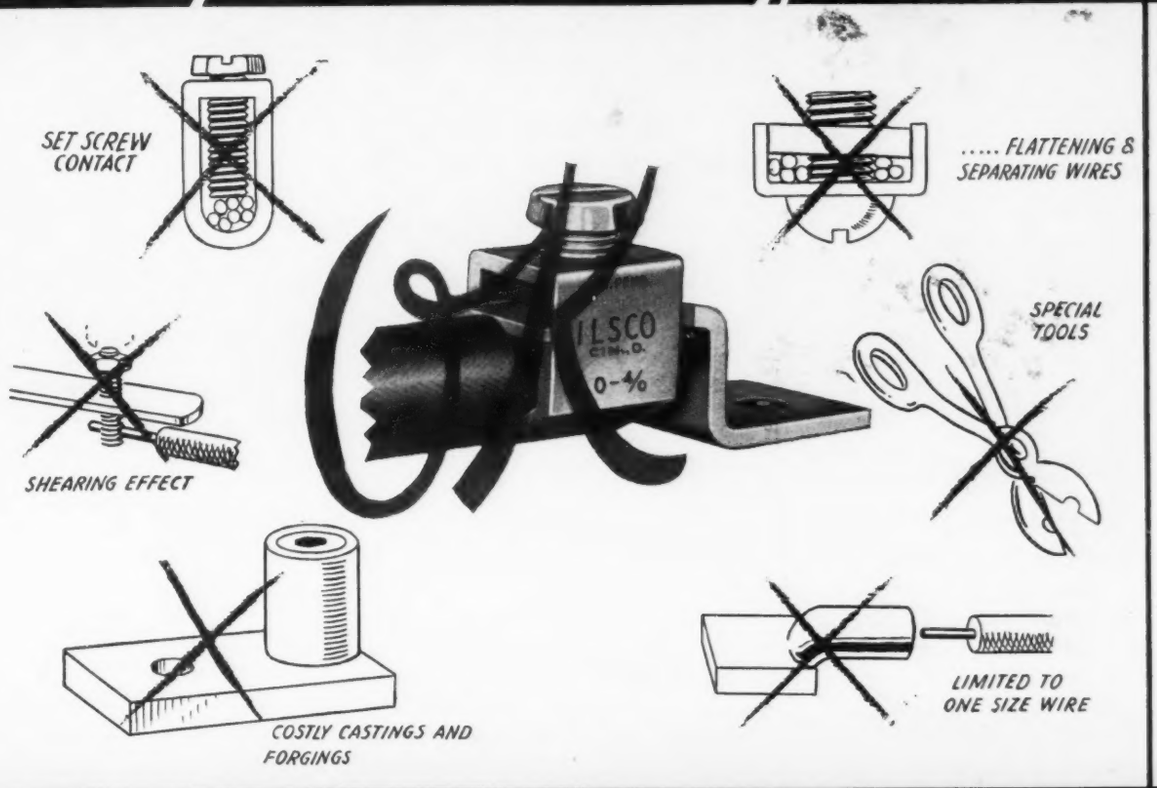
DAVENPORT, IOWA—Eastern Iowa Electrification Corporation, H. J. Strong, manager, recently organized, plans transmission and distributing lines in Butler, Pleasant Valley, Lincoln and other townships for rural electrification, totaling about 150 miles, with power substation and service facilities. Franchise is being secured.

FLORENCE, ARIZ.—San Carlos Irrigation District is making surveys and estimates of cost for transmission and distributing lines for service in rural districts near city. Financing will be arranged through Federal aid.

HAMMOND, IND.—Lever Brothers Company plans installation of motors, controls, regulators, conveyors and other equipment in new additions to soap-manufacturing and edible oil plant. Project will be carried out in 1936. Cost close to $5,000,000. Company headquarters are at Cambridge, Mass.

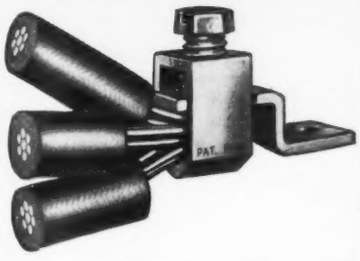
RICHMOND, VA.—Virginia Electric & Power Company plans new transmission and distributing lines for rural electrification

Complete Satisfaction



with ILSCO LUGS

SOLDERLESS



Simplicity Itself—two words that admirably describe the "ILSCO" Solderless Connector.

No Special Tools are Required to attach wire to connector; you need only a wrench or screw driver—takes less than a minute.

Wires are not Flattened or Separated. Simply insert the wire, tighten down the screw—the wire is forced into a solid, triangular mesh.

No Set Screw Contact, consequently no shearing or cutting of wires.

No Castings. "ILSCO" connectors are made of drawn, electrolytic copper. Results: higher conductivity, lower cost.

"ILSCO" Solderless Lugs are Not Limited to One Particular Size Wire, nor to stranded wire only. They will grip solid wires just as firmly as stranded. Each connector will take three or four different size cables.

Deeper Collars can be Furnished, to accommodate more than one wire.

Your examination of our connector will convince you that it has been designed to meet your requirements.

Simple Construction ~ Exceptionally Low Cost

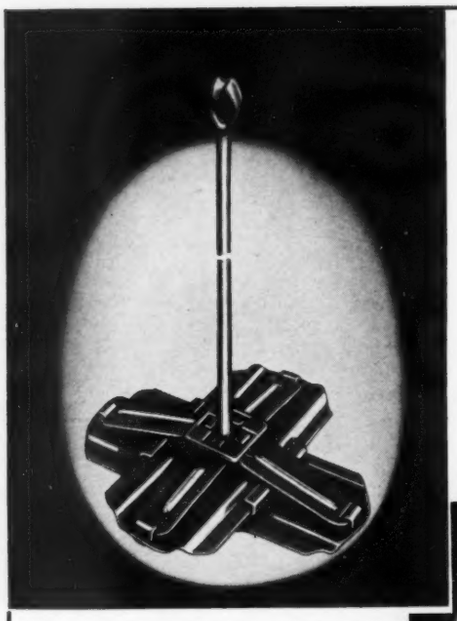
SOLDERING

Each Lug Marked. Stamped on the barrel of each "ILSCO" Soldering Lug are wire size, ampere rating and Underwriters' approval markings.

Two Exclusive Features. First—markings have been transferred from flat to barrel, where they logically belong. Result, markings are not hidden by nuts or other clamping devices. Second—Maximum wire size marking. This information is not only important to electrical contractors and trade, but is of great concern to the jobber and manufacturer, whose business it is to see that their customers get the best.

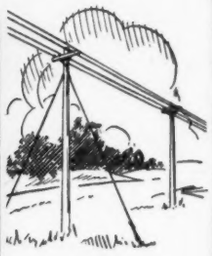
Convince yourself that ILSCO Lugs will give you COMPLETE SATISFACTION.
Send for additional information, samples, and prices. Address Dept. EW.

ILSCO COPPER TUBE & PRODUCTS, INC., 5629 Madison Road, Cincinnati, Ohio



CHANCE ANCHORS

Chance Anchors are made in all types and sizes. The four way steel Expanding Anchor shown at the left is one of the most satisfactory Expanding Anchors on the market because the blades expand in opposite directions, thereby eliminating side twisting.



CHANCE CAPSTAN PULLEY BLOCKS

are light weight, safe, and easy to handle, and give a mechanical advantage of 32 to 1.

Write for Circular.

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Constant Improvement in Organization and in Methods

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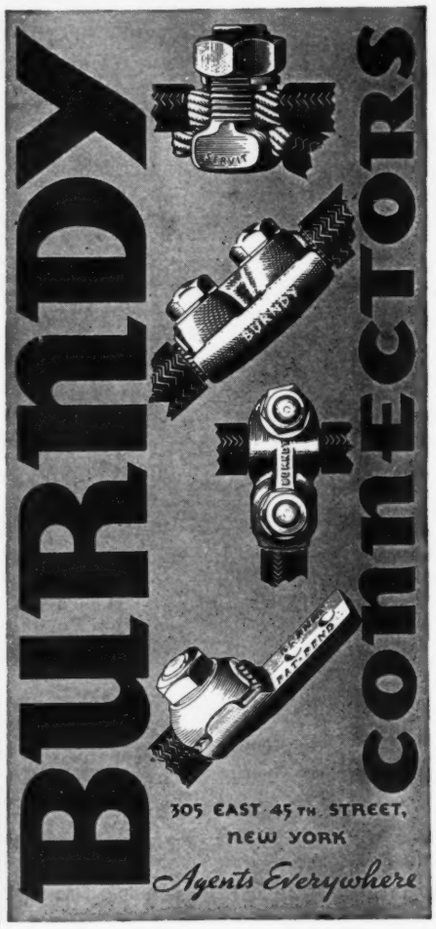
ERECTORS OF TRANSMISSION LINES



in part of Currituck County, totaling close to 24 miles, with power substation and service facilities. Cost about $45,000.

JACKSON, MICH.—Consumers Power Company plans extensions and improvements in transmission and distributing lines in different parts of State in 1936, for rural electrification. Cost close to $2,000,000, with power substation and service facilities. Company will make an ultimate expenditure of over $4,000,000 for further expansion in lines, closely following immediate program.

PITTSBURGH, PA.—Jones & Laughlin Steel Corporation plans installation of motor-generator sets, heavy duty motors and controls, regulators, panel boards, conveyors, electric cranes and hoists, and other equipment in new steel sheet and strip mills. Project will be carried out during 1936. Cost close to $25,000,000. Company is arranging financing in gross amount of $40,000,000 for this and other mill expansion and improvements.

WINDOM, MINN.—Plans extensions and improvements in city-owned electric power plant, including installation of new Diesel engine-generating units and auxiliary equipment. Cost about $100,000. Proposed to ask bids soon. Rose & Harris, Essex Building, Minneapolis, Minn., are consulting engineers.

JACKSONVILLE, FLA.—Plans extensions in transmission and distributing lines for rural electrification in neighboring districts, furnishing service from city-owned electric plant. Cost about $75,000, including service facilities. Board of Utility Commissioners, Ernest E. Anders, director, is in charge.

PITTSBURGH, PA.—United States Engineer Office receives bids until January 11 for two vertical type motor-driven pumping units, with motors and auxiliary equipment, for Tygart River reservoir dam (Circular 161).

ALBANY, N. Y.—New York Power & Light Corporation plans extensions in transmission and distributing lines in vicinity of Ballston Spa, totaling close to 25 miles. Cost over $40,000.

OMAHA, NEB.—Agricultural Power-Alcohol Corporation, care of Bert LeBron, head of LeBron Electrical Works, 314 South Twelfth Street, recently organized by Mr. LeBron and associates, plans installation of motors and controls, electric pumping machinery, boiler units and other equipment in new automotive fuel plant at Fourth and Pierce Streets, where property has been acquired. Cost about $100,000.

THOROLD, ONT.—Ontario Paper Company, Ltd., has approved plans for new steam-electric power plant for service at local mill. Part of equipment will be furnished by Foster-Wheeler Company, Ltd., St. Catherines, Ont. Cost close to $1,000,000. Completion is scheduled early next spring.

BARTOW, FLA.—Plans early call for bids for extensions in city-owned electric light and power plant, including installation of Diesel-generator unit and auxiliary equipment; also for extensions in transmission lines. Bids recently received have been rejected.

WASHINGTON, D. C.—Bureau of Supplies and Accounts, Navy Department, Washington, receives bids until January 7 for 39,000 feet of electric cable for Brooklyn, N. Y., and Mare Island, Calif., Navy Yards (Schedule 6805).

SILVER CITY, N. M.—Community Public Service Company is considering new addition to steam-electric generating plant, including installation of equipment for large increased capacity. Estimates of cost will be made soon. Additions in transmission lines also proposed. Project will be carried out during 1936.